

1 VIRGINIA:

2 IN THE CIRCUIT COURT FOR THE COUNTY OF HENRICO

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5 COMMONWEALTH OF VIRGINIA, : Case Nos.:

6 Plaintiff, : CR17-4909-00F

7 vs. : CR17-4910-00F

8 : CR17-4911-00F

9 ROLAND E. ANDERSON, : CR17-4913-00F

10 Defendant. :

11 - - - - -:

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13 Transcript of the proceedings in
14 the above-styled matter, when heard on January 4, 2019
15 before the Honorable Richard S. Wallerstein, Jr., Judge.

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1 THE CLERK: Commonwealth of Virginia versus
2 Roland Ellsworth Anderson, case numbers CR17-4909, 4910,
3 4911, and 4913-00F.

4 THE COURT: Good morning to you, sir. Are you
5 Roland E. Anderson III?

6 DEFENDANT ANDERSON: Yes, sir.

7 THE COURT: The record will so reflect. You may
8 have a seat, sir. Mr. Mikula, good morning.

9 MR. MIKULA: Good morning.

10 THE COURT: Mr. Ackley, good morning. Ms. Ulmer,
11 good morning again.

12 MS. ULMER: Good morning.

13 THE COURT: The matter is set for eleven o'clock
14 today January 4, 2019 by the clock it's 10:52, any objection to
15 starting a few minutes early Mr. Mikula?

16 MR. MIKULA: No, sir.

17 THE COURT: And on behalf of the Commonwealth,
18 Ms. Ulmer?

19 MS. ULMER: No, sir.

20 THE COURT: All right. This comes before the Court
21 by way of Defendant's motion in limine. How would you folks
22 like to handle that issue?

23 MS. ULMER: Your Honor, the Commonwealth
24 agrees with the Defense that it is the Commonwealth's burden
25 so we are happy to go with that.

1 THE COURT: Treat it much like a motion to
2 suppress and the Commonwealth to go first?

3 MR. MIKULA: That's fine.

4 THE COURT: That works for you Mr. Mikula?

5 MR. MIKULA: Yes, sir.

6 THE COURT: All right. On behalf of the
7 Commonwealth, Ms. Ulmer?

8 MS. ULMER: Yes, sir, your Honor. Your Honor, at
9 first the Commonwealth would like to submit Commonwealth's
10 Exhibit number one, the raw DVD video, which we will be
11 using in our presentation. It has been provided to the Defense.

12 THE COURT: Any objection?

13 MR. MIKULA: No objection.

14 THE COURT: All right. That looks like it's a DVD or
15 CD?

16 MS. ULMER: Yes, sir.

17 THE COURT: Okay and will it work if the Court
18 places the exhibit sticker on the disk itself as opposed to on
19 the sleeve?

20 MS. ULMER: Yes, sir.

21 MR. MIKULA: I've printed off hard copies as well
22 that I can administer.

23 THE COURT: I would prefer to put it on the disk if it
24 turns out that somehow or another it doesn't work, it doesn't
25 allow it to be played on the disk, I'll remove the exhibit sticker

1 and put it on the envelope.

2 MR. MIKULA: Yes, sir.

3 THE COURT: Marked as Commonwealth's Exhibit
4 number One and return it to the Commonwealth, Deputy.

5

6 NOTE: Commonwealth's Exhibit 1.

7

8 THE COURT: Thank you. Ms. Ulmer?

9 MR. ACKLEY: Actually, I don't think we need that
10 exhibit. It can just be introduced into evidence.

11 THE COURT: All right, thank you. Commonwealth's
12 One.

13 MS. ULMER: Your Honor, the first witness is
14 Jeremy D'Errico.

15 THE COURT: I'm sorry Jeremy?

16 MS. ULMER: D'Errico.

17 THE COURT: Mr. D'Errico, please.

18 THE DEPUTY: Would you step up to the witness
19 stand for us, please?

20 THE COURT: Watch your step as you step through
21 the opening and when you have a moment, would you raise
22 your right hand? Do you swear or affirm the testimony you're
23 about to give is the truth, the whole truth and nothing but the
24 truth?

25 WITNESS D'ERRICO: I do.

1 THE COURT: You can have a seat.

2 WITNESS D'ERRICO: Thank you.

3 MS. ULMER: Your Honor, Agent D'Errico has
4 prepared a presentation today. I've given a hard copy to Mr.
5 Mikula. It is going to be displayed on the television but I also
6 have a hard copy for your Honor if you would like to look at
7 that.

8 THE COURT: All right, any objection Mr. Mikula?

9 MR. MIKULA: No, sir.

10 THE COURT: All right, I'll be happy to review and
11 receive the hard copy. That's not an exhibit, this is for simply
12 demonstrative purposes, is that correct?

13 MS. ULMER: Yes, demonstrative or a visual aid.

14 THE COURT: Okay. The witness has been sworn.

15 MS. ULMER: Thank you.

16

17 **SPECIAL AGENT JEREMY A. D'ERRICO**, the
18 witness, having previously been duly sworn, testified as
19 follows:

20

21 DIRECT EXAMINATION

22 BY MS. ULMER:

23 Q Agent D'Errico, can you please state your name for
24 the Court?

25 A Good morning. My name is Jeremy D'Errico. The

1 last name is D-apostrophe-capital E-R-R-I-C-O.

2 Q And I've already called you Agent but how are you
3 employed?

4 A I'm a Special Agent with the Federal Bureau of
5 Investigation.

6 Q How long have you been employed by the FBI?

7 A Approximately six years.

8 Q And how do you, before being in your current
9 position, have you held any other positions with the FBI?

10 A Yes, so I'm currently a Special Agent. I've been a
11 Special Agent for the past four years. Prior to being a Special
12 Agent, I was a computer scientist for the FBI for two years.

13 Q And where did you receive your education?

14 A My undergrad is a Bachelor's of Science or a
15 Bachelor's of Science in Computer Science from James
16 Madison University. And I also have a Master's of Information
17 Security from the Johns Hopkins University.

18

19 MR. MIKULA: For purposes of the record, we're
20 willing to stipulate to his expertise as a digital forensics expert.

21 THE COURT: Is that acceptable with you?

22 MS. ULMER: Judge, just in the chance of appeal,
23 your Honor, we'd like to go through a little more questions.

24 THE COURT: All right.

25 MS. ULMER: Just to qualify him but I appreciate

1 Mr. Mikula's motion.

2 THE COURT: Please proceed.

3

4 BY MS. ULMER:

5 Q What team are you currently a member of at the
6 FBI?

7 A I'm assigned to the Richmond division and assigned
8 to the violent crimes squad. This case in particular I
9 investigate organized crime. But I also handle threats to life,
10 bank robberies, other violent crime matters as well as an
11 additional duty, the CAST team, which is the Cellular Analysis
12 Survey Team.

13 Q And before you came to the FBI, did you work
14 anywhere else?

15 A I did. I worked for about seven years for the Meyer
16 Corporation. And as part of the Meyer Corporation I was an
17 information systems engineer where I was detailed to the FBI
18 to investigate some of the largest criminal cyber matters
19 dealing with large quantities of data.

20 Q And you mentioned the CAST team that's what you
21 currently are on, could you please explain to the Judge what
22 CAST is?

23 A The CAST team, the Cellular Analysis Survey Team.
24 We're a team of approximately 75 Special Agents or task force
25 officers located throughout the world. And we are specially

1 trained in analyzing historical cell site records and providing
2 analysis of tower locations and where telephone calls may or
3 may not have been placed. The CAST team is specially trained.

4 All of us have in excess of 300 hours of specific training,
5 which may include radio frequency analysis, training from the
6 major telecom providers, their network engineers and their
7 custodians of records so that we understand how these records
8 are collected and how their networks work. We also receive
9 training from academic instructors both Bureau instructors
10 and from the private sector.

11 Q And so you've already touched on this but do you
12 receive training directly through cell phone providers as well?

13 A We do. We receive training from Verizon, Sprint,
14 AT&T, US Cellular and T-Mobile.

15 Q And before you become a CAST member, do you
16 have to pass a written test?

17 A I do. And we're evaluated throughout the course of
18 our training. So our training starts off with a week of basic
19 training, which is how to understand these records and how to
20 plot them on maps. The top performers from that class move
21 on to the advanced training class where we deal with more of
22 the same. Top performers from that class move on to the field
23 training exercise where we are doing multiple analyses a day
24 and going out and working historical cases, where we know
25 phones were found. And then we move on to the two-part

1 certification each two weeks where we meet and train with the
2 different providers on their networks and the academic
3 instructors.

4 Q Once you become a CAST member, do you have to
5 recertify every year or do you maintain that status?

6 A We do. We recertify every year. We take
7 approximately forty hours of training each year in order to
8 refresh on new technologies and to make sure that we still
9 have a good understanding of our trade craft.

10 Q Approximately how many cases of historical cell site
11 requests does CAST receive every year?

12 A We received I believe it was about 1700 since the
13 inception of CAST, which started in 2010. Last year alone, or
14 FY17, I think we are up to 300 cases alone. We provided
15 expert testimony on 300 occasions in 2017 in courts similar to
16 this.

17 Q Is that courts in the entire country or?

18 A That's across the country, both federal, state and
19 local courts.

20 Q And you, yourself, have you ever testified in an
21 expert capacity in Virginia state courts?

22 A I have as to Google location records and that was in
23 Henrico County on three occasions last year.

24 Q Can you briefly explain to us what exactly historical
25 cell site analysis is?

1 A Yeah, historical cell site analysis is matching up the
2 call detail records and the cell site information that's provided
3 by the carriers to a tower list that's provided by the carriers.
4 So the carriers document where all their towers are and the
5 directions of their antennas so that we can take that
6 information and marry it up with the call detail records. That
7 tells us the starting tower of that phone call and the ending
8 tower of that phone call and we can place that, an indication
9 on the map of the approximate location of the mobile device,
10 the phone when it was making that call.

11 Q So when you get historical cell site analysis, how do
12 you use that analysis, what do you use that to determine?

13 A We determine the approximate location of the phone
14 at that time. And we cannot get it down to a room in a house.
15 But we can tell an approximation of where that phone may
16 have been during that transaction. And that can be a call or a
17 text message or a data transaction.

18 Q As a CAST member, how do you apply your
19 knowledge of historical cell site data to what you are asked to
20 do for the FBI?

21 A They are very similar. So both the cell sites and the
22 collection of GPS and Wi-Fi data, they both depend on radio
23 frequency analysis. We were provided records by Google to
24 review and analyze and Google has provided certain
25 information for us to be able to plot those records on a map,

1 along with what they call an accuracy radius of the
2 approximation of where they believe that phone was.

3 Q And can you use that information in order to locate
4 fugitives?

5 A Yes, we can and we have in the past.

6 Q How else have you used that information?

7 A We've used that information to help find missing
8 children, used that to help find fugitives that are fleeing from
9 the law. We have used that information in numerous ways
10 and corroborate that information as much as possible, whether
11 that be witness statements or other data that's available to us
12 at that time.

13 Q And when you are using this technology, whether it
14 be the cell site location information or Google information or
15 GPS information, what knowledge, skills and abilities are
16 required of you in order to be able to analyze that?

17 A Knowledge of the records and how these records
18 come to be. And that's where Cell Cos or cellular providers
19 provide instruction of how these records are generated.
20 Knowledge of the towers and an understanding of how radio
21 frequencies work. How does a phone interact with a tower?
22 How does a phone interact with a GPS sensor or a Wi-Fi sensor
23 and overall how these things work in order to generate these
24 records which then we can take and plot on a map.

25 Q Turning specifically to Google, have you prior to this

1 case, have you previously worked with Google location data?

2 A Yes, I have. Approximately 18 cases I've worked
3 with Google location data from various different cases.

4 Q Have they all been cases involving Henrico County
5 or other jurisdictions as well?

6 A Other jurisdictions as well.

7 Q Have you used historical records such as Google or
8 cell site in order to exclude suspects as well as figure out
9 where they are?

10 A I haven't personally done that but members of the
11 CAST team have used information from cell site to exonerate
12 subjects, yes.

13 Q What kind of records do you look at in order to
14 conduct your cell site analysis?

15 A I look at the records that are provided from the
16 provider. And in this case it would be the Google records that
17 are reviewed. And Google's records already provide a latitude
18 and longitude, a coordinate of where they estimate that mobile
19 device to be at that time.

20 Q So when you get the records from Google, what is
21 your process, what do you do?

22 A I look at the records and the records are coded in
23 UTC time, Universal Time. So I adjust those records to be in
24 the local time zone. And in this case, I believe it was Eastern
25 Daylight Time. So we make that conversion so that we're

1 looking at the accurate time of where that device was when the
2 records, or according to the records. I then take that
3 information and two pieces on there or three pieces, the type or
4 the source of that record and that could be one of many things.
5 It could be from a GPS sensor. It could be from a Wi-Fi
6 sensor. It could be from a cellular tower sensor. Or it could be
7 unknown. I take the coordinates and then I take that accuracy
8 radius that they give us and I plot that information on a map
9 so we can see where Google believes that phone was, their best
10 estimate.

11 Q How do you plot that on a map?

12 A I use a variety of tools. What I need to do is convert
13 it into what we call keyhole markup language, it's KML and
14 that's the language that Google Earth understands in order to
15 import this data. So I have a process to convert that into the
16 correct format for KML. And then I load it into Google Earth so
17 I can view all of these points on a map.

18

19 MS. ULMER: Your Honor, at this time, we are
20 asking that Agent D'Errico be an expert in the field of historical
21 cell site data and location data analysis at this time.

22 THE COURT: I'm sorry, historical cell site data?

23 MS. ULMER: And location data analysis.

24 THE COURT: Do you care to voir dire Special Agent
25 D'Errico, Mr. Mikula?

1 MR. MIKULA: With regard to the location service
2 expert or service expertise, yes, sir.

3 THE COURT: All right.

4

5 VOIR DIRE EXAMINATION

6 BY MR. MIKULA:

7 Q You've never had any specified training from a
8 Google developer or engineer, have you?

9 A Not specifically from Google.

10 Q So you're not privy to their algorithms or digital
11 formula and how they create the data that you're given,
12 correct?

13 A I am not privy to the exact algorithm as it is a trade
14 secret to them. However, based on the data that is collected
15 from the sensor from the phone, we can make some
16 estimations based on academic papers as to what techniques
17 they may be using.

18 Q So you can see it as an approximation?

19 A It is an approximation, that's correct.

20 Q And so you're not aware of the margin of error for
21 the Google location services at all?

22 A Other than we have conducted some testing where
23 we have tested the accuracy of that information. We do not
24 have a precise number to tell you for an error rate. But I can
25 show you in two slides some of the testing we have done to

1 determine the approximate location of, the approximation of
2 Google's estimation versus the actual location where we were
3 when we were testing.

4 Q And so have you been to any seminars or any other
5 continuing education that's been presented from a Google
6 representative?

7 A Not directly from a Google representative, no.

8 Q Okay, so essentially what you're saying is, is you
9 received this data from Google, you analyze it based on your
10 training and expertise as a cell site expert and your other
11 credentials and then you plot it using the Google Earth
12 application as well as other methods of software, is that fair to
13 say?

14 A That's correct, yes.

15

16 MR. MIKULA: Okay, nothing further.

17 THE COURT: Do you care to be heard on the
18 request for –

19 MR. MIKULA: Well, I have no problem stipulating
20 his credentials as a digital expert, a forensic expert or a cell
21 site or a cell data expert. The Google locations qualification,
22 Judge, I do have concern for because it's kind of part and
23 parcel with what our argument here is today is that he is
24 certainly somebody who is qualified in a lot of areas but with
25 regard to being an expert and opining as to the reliability of

1 Google's information, he has no background in that
2 information. He doesn't know the DNA. He doesn't know the
3 foundation of Google and certainly there are other ways in
4 which the Commonwealth can satisfy reliability through other
5 evidence but I don't think he's qualified to be a Google expert
6 in this Court's eyes.

7 THE COURT: All right, at this time the Court will
8 receive Special Agent Jeremy D'Errico as an expert in historical
9 cell site data and location data analysis based upon his
10 testimony and the cross examination by defense counsel. The
11 Court notes the exception to the Court's ruling by counsel for
12 the Defendant. Proceed.

13

14 FURTHER DIRECT EXAMINATION

15 BY MS. ULMER:

16 Q You already touched on this a little bit but based on
17 your training and experience and in viewing academic papers,
18 can you tell us how Google can determine the approximate
19 location of a device?

20 A Yes. There are several ways that Google can do that.
21 And that's tied to the source column that I was speaking
22 about in the records before. So the first way and the way
23 that's probably most accurate for outdoors would be using the
24 GPS, the Global Positioning System sensor in the phone. And
25 Google is constantly collecting information from phones. And

1 they admit to such and documentation both on their website
2 and marketing material and in other locations. So Google is
3 collecting this information and GPS is very accurate when
4 outdoors. Indoors there is some reliability issues with it but
5 Google doesn't collect just GPS. It also collects other wireless
6 signals in the area. So in the case of a Wi-Fi source, Google is
7 collecting all of the Wi-Fi access points that we may have in
8 our house or a business to try to identify where it is. And
9 Google collects information on a normal basis of, you know,
10 from our phones, from every Android phone that has location
11 services turned on. It's collecting a GPS coordinate and the
12 Wi-Fi that's around the area. So that when it gets into a
13 situation where a GPS signal might not be turned on on the
14 phone, because GPS is very expensive as far as resources, it
15 drains the battery faster than Wi-Fi would, Google has
16 reference data so they can say well I've seen these four Wi-Fi
17 access points before at this signal strength and last time I saw
18 them, this was the GPS coordinate of the phone that saw it at
19 those similar strengths. So I believe that the coordinate or the
20 estimation of this phone would be in this area. And that's
21 accurate because Wi-Fi has a limited distance in which it can
22 actually broadcast out. Approximately 250 meters outside on
23 a perfect, under perfect conditions is about the range that Wi-
24 Fi can broadcast. Other sensors are less but indoors and most
25 access residentially are indoors, a paper has said that it's

1 about seventy meters of accuracy. So Google knows that these
2 signals degrade over time to a point where a phone can't see
3 that signal. So if that phone is seeing that Wi-Fi signal, that
4 means it's in the immediate vicinity of that Wi-Fi access point.

5 And Google has previously collected information on where Wi-
6 Fi access points are located across the entire world. It's a huge
7 industry to collect that type of data and the location data
8 services market. And research on this topic goes back way
9 past 2006. It's not really a new topic. We've had radio
10 frequency research done for years at this point.

11 Our third classification of data would be cellular and
12 that's through cell towers. So if they can't get a fix on a GPS
13 signal, if they can't get a fix on Wi-Fi signals, it's going to fall
14 back to the cellular towers. And as you may know, the cellular
15 towers have a much larger span than a Wi-Fi access point.
16 And cellular towers can reach out a mile or so if not more
17 depending on how the network has set up those cellular
18 towers. So Google can fall back on that information saying well
19 at least I know that this phone was in this vicinity of this
20 cellular tower and can draw say a mile radius around that
21 tower.

22 Q You made a lot of statements about what you believe
23 Google does, how do you know this, what is your knowledge
24 about that?

25 A I've done a bunch of research on Google, on

1 documents that Google has provided themselves, on
2 documents that other researchers have provided and
3 documented in papers. And I also understand other tests that
4 have been conducted on Android phones to understand what
5 type of data is flowing from the phone up to Google in order to
6 make these decisions on the location services.

7 Q And you already kind of hinted at this a little bit, but
8 is the field of determining where a mobile device is based on
9 radio signals new?

10 A It is not new at all. CAST has been doing this type
11 of work since 2006. The unit was formed in 2010 to formalize
12 it but cellular providers have been collecting this type of
13 information to troubleshoot their networks pretty much since
14 instantiation of cell phones. And they need this information to
15 be able to operate their network, to run diagnostics on their
16 network and to make sure that their customers are being
17 served. They are profit seeking and if they are not properly
18 serving their customers, they are not making a profit, which
19 means they would not survive. So they have much motivation
20 to make sure they know where their customers are while
21 making phone calls.

22 Q So can you determine the approximate location of a
23 mobile device by using the location history data?

24 A Yes, we can.

25 Q Okay and that's by using all the different points that

1 you described, Wi-Fi, GPS and cell tower?

2 A That's correct. And we try not to rely on any single
3 one point. But we try to take multiple points and multiple
4 pieces of data into consideration in making a determination of
5 where the approximate location of that phone.

6 Q And did you complete that analysis for this case that
7 we're here for today?

8 A Yes, I did.

9 Q And typically were you asked to review location data
10 for a Google account that was
11 Roland.Anderson1907@Gmail.com?

12 A Yes, I was.

13 Q And in doing that analysis, did you prepare this
14 PowerPoint presentation we're about to look at?

15 A I did, yes.

16 Q Speaking about Google, can you give us a general
17 overview of Google as a company?

18 A Yeah, Google is a subsidiary of Alphabet. And it is, I
19 believe, it is number three or four, the number three or four
20 highest trading company on the stock exchange. It depends on
21 which day you look. But their 2017 revenues were \$110
22 billion and of that \$110 billion, \$95 billion of it was from
23 advertising revenue. Their main source of income is
24 advertising. And the same with Q1 to Q3 of 2018. \$97 billion
25 of revenue with \$83 billion of it coming from advertising.

1 Google provides a number of products. The notable ones here
2 might be the search engine Google.com, their email program
3 Gmail.com, their Google Maps that is used to, you know,
4 provide directions or navigation, their Android operating
5 system, which is one of the top two operating systems for
6 mobile phones. And then of course advertising, all the ads
7 that we see on Google.com or in our emails or other on their
8 mobile phones as well.

9 Q And to give all these products, they have to have a
10 privacy policy, are you familiar with Google privacy policies?

11 A Yes, I am and they've had several privacy policies
12 over the years.

13 Q Do they discuss location data in their privacy
14 policies?

15 A They do and they started discussing location data in
16 their privacy policy back in 2009, again, nothing that's new in
17 this field.

18 Q Specifically do they talk eventually about Wi-Fi
19 location data in their privacy policy?

20 A They do. In 2012, they modified their privacy policy
21 to specifically include that they may receive from your phone
22 nearby Wi-Fi access points and cell towers.

23 Q And do they continue to update their privacy
24 policies?

25 A They do. They've updated it, they've updated the

1 location portion of it three times since the current policy.

2 Q And do those privacy policies continue to indicate
3 Wi-Fi access point and cell towers as well?

4 A Yes, they do.

5 Q And is this a current privacy policy?

6 A This is a portion of it dealing with the location
7 information.

8

9 MS. ULMER: This is slide four for the record.

10

11 BY MS. ULMER:

12 Q And I believe on slide four you've highlighted a
13 particular portion, what is that portion?

14 A I did. So when you hover over the fourth point on
15 the bottom left, the information about things in that device, I'm
16 sorry, information about things near your device, such as Wi-Fi
17 access points, cell towers and Bluetooth enabled devices. If
18 you click on that link, you'll see that panel on the right side
19 that explains a little bit more the information about things
20 near your device. And specifically, I've highlighted the other
21 sensors that Google says that it's going to collect such as
22 information from accelerometers or nearby cell towers or Wi-Fi
23 access points and specifically the MAC address or the Machine
24 Access Code address and signal strength of that Wi-Fi access
25 point.

1 Q And when you were talking earlier about the
2 accuracy of Wi-Fi points, you were talking about signal
3 strength, is that what a MAC address is?

4 A The MAC address is the unique identifier for the Wi-
5 Fi access point. So it's kind of a like a telephone number for
6 that device. The signal strength would be, you know, how loud
7 and how clear is that signal being received.

8 Q Turning to the next slide, Google itself talks about
9 and categorizes locations in two different categories, correct?

10 A It does. Google says that it's going to collect
11 information on implicit location information or explicit location
12 information. And implicit location information would be
13 similar to, you know, actually I'll read their example. If you
14 type in Eiffel Tower, we, Google, infers that you may like to see
15 information for places near Paris and then we can use that to
16 provide recommendations about those local places to you. So
17 based on your search history and what you're searching,
18 they're inferring in where you may be or the information that
19 you were trying to see.

20 Q And what about explicit location information?

21 A Explicit location information is collecting information
22 but from the sensors of your phone; so from the GPS sensor in
23 your phone, from the Wi-Fi sensors and the accelerometer and
24 gyroscope that are all built into modern day smart phones.

25 Q Going to slide six, what does Google say location

1 history does?

2 A Location history will include information that Google
3 receives from location reporting, which is a device level setting
4 that allows your device to send location data back to Google for
5 use in location history. Essentially what it's saying is, it's
6 determining your location history from the information that
7 you are allowing your phone to send back to Google. And
8 that's an option that you can turn on or off on your Android
9 device.

10 Q And why would Google want to use location history
11 data?

12 A Location history data is good for ad revenue. It
13 allows their ad subscribers to target individuals in a certain
14 area. For example, and this is a made up example but maybe
15 PetSmart would like to target customers that are going to
16 Petco, a competitor. They can set up an area that they would
17 like to send a five dollar coupon to, to anybody approaching a
18 Petco store. And the same thing, you know, they could also
19 send a five dollar coupon to anybody approaching a PetSmart
20 store. But they would not send that five dollar coupon to
21 somebody say approaching a Walmart that is nowhere near a
22 Petco or a PetSmart. It allows them to really focus in location-
23 wise on where they want to send that advertisement. And with
24 advertisement revenue being such a large portion of Google's
25 revenue, they have a huge incentive to get this right, this

1 location correct.

2 Q And based on your knowledge, do they tell
3 prospective buyers of Google advertising that they can target a
4 particular location? Is that something that they advertise as
5 being a service?

6 A They do. As part of their Google Ads service, which
7 you can subscribe to and start pushing out ads, one of the
8 categories of ads is a radius around a location. So they are
9 saying that it allows you to choose to show your ads to
10 customers within a certain distance from your business rather
11 than choosing individual cities or regions or countries.

12 Q That was the example you were giving us of Petco
13 and PetSmart?

14 A It was.

15 Q For advertising?

16 A Correct.

17 Q And in order to use radius advertising, the Google
18 information, location information must be accurate?

19 A Correct, that's correct.

20

21 MR. MIKULA: Objection.

22 THE COURT: State your objection, please.

23 MR. MIKULA: I think to assume that it's accurate.

24 THE COURT: It calls for speculation.

25 MR. MIKULA: I would say so.

1 THE COURT: All right, objection sustained on that
2 question.

3 MS. ULMER: I'll move on.

4

5 BY MS. ULMER:

6 Q Moving on to slide eight, why else would Google
7 want to use location data?

8 A Google has their Google Maps platform where they
9 use web services. And this is where Google can allow other
10 companies or other applications to use their geolocation
11 services. And in this advertisement for their geolocation with
12 Google Maps, Google claims that they have the largest network
13 of Wi-Fi points and cell IDs to ensure coverage anywhere on
14 the Earth and that they are consistently updating through
15 crowdsourcing from billions of Androids phone. No GPS is
16 required in order to use their crowdsourcing location. And
17 they also make a claim on their accuracy of their geolocation.
18 The claim is, you know, advanced positioning algorithms
19 deliver typical accuracies of ten to twenty meters and excel and
20 problematic indoor and urban environments where GPS
21 struggles. Perfect for IOT, which is internet of things, asset
22 tracking, wearables and compliance.

23 Q We've already touched on this a little bit but how
24 can the location be determined?

25 A The location can be determined using various

1 sensors on the smart phone. I listed a few of them, GPS, Wi-Fi,
2 cellular, Bluetooth and those cover the radio frequency or the
3 radio spectrum sensors. Then you have accelerometers and
4 gyroscopes that determine if the phone is moving or how the
5 phone is positioned. If it is positioned north, south, east, west,
6 you know, on a tilt. A barometer that helps Google determine
7 which floor in a building that you may be in. And then other
8 user provided information such as directions from one place to
9 another to determine approximate location.

10 Q And how do you know that Google uses these
11 different sensors?

12 A Google has listed them in their various privacy
13 policies and I believe we saw most of them in previous policies.

14 Q Turning back the next slide, specifically GPS, how is
15 that location collected through the GPS sensors?

16 A There is a GPS receiver chip on all modern, most
17 modern smart phones. And that GPS chip is listening to radio
18 broadcasts from, you know, I believe it's 32 different satellites
19 that the U.S. military has put into orbit. And Google needs or
20 the phone needs about four of them to come up with a precise
21 location of where that receiver or that phone may be. It's very
22 accurate and very precise, especially outdoors. But it does
23 have some downfalls. Specifically, what we call urban canyons
24 or big cities where it's hard to see blue sky above you that does
25 interfere with those radio signals. And the way that it

1 determines its location from those radio signals is that one of
2 the elements of messaging in that radio signal is the precise
3 time that that signal was sent. And that GPS receiver
4 understands the orbit that that satellite is in and can calculate
5 the distance that that signal needed to travel from that satellite
6 to that receiver and the amount of time that it took to transmit
7 that signal. And based on that information and signals from
8 three other satellites, it can determine a precise location of
9 where that receiver is.

10 Q How do you know how the GPS works?

11 A Based off of research papers that are published in
12 academia and documentation from GPS.gov, which is the
13 governing body for GPS in the U.S.

14 Q Do you get training in GPS?

15 A We have discussed it. I wouldn't call it explicit
16 training in it. It's more research that I've conducted.

17 Q Research on your own. Turning now to Wi-Fi, how
18 exactly does Wi-Fi work in terms of position of a cell?

19 A There is multiple ways that you can use Wi-Fi
20 access points in order to determine positioning. And a lot of
21 this research was done back in 2006, 2008 when they really
22 started tackling alternative ways to determine location other
23 than GPS. In particular, most of the research is for indoor use
24 to determine which particular room or which particular area in
25 a building that you may be. And that's in an area where there

1 is many, many Wi-Fi access points crammed into a small area
2 so that you have a really good understanding. There's also
3 been papers about using Wi-Fi in the outdoors and particularly
4 studies walking down city streets because of the limitations of
5 GPS and how they can determine locations from multiple Wi-Fi
6 access points.

7 And the three techniques that I pulled out here are
8 cell identity, which is probably the least accurate of the three.
9 And that is essentially using a single Wi-Fi access point and
10 looking at the signal strength from that Wi-Fi access point and
11 then translating that into an approximate distance. So of
12 course, if we don't see that Wi-Fi access point, we know that
13 we're nowhere near that Wi-Fi access point. But if we see that
14 Wi-Fi access point, we know that we're at least in proximity of
15 it.

16 And as we mentioned before, Google does a lot of
17 crowdsourcing and a lot of collection of where Wi-Fi access
18 points are. So they have a huge database of the approximate
19 locations of Wi-Fi access points. In fact, they have mine at
20 home and they most likely have everybody's here, the location
21 of their Wi-Fi access points because they've collected that
22 through crowdsourcing or driving their Google street cars
23 through the streets. So cell identity, they can't tell you a
24 direction from that access point, it just knows that you're in
25 the vicinity of that Wi-Fi access point.

1 Trilateration uses multiple Wi-Fi access points.
2 Similar to how GPS measures the distance, trilateration is
3 trying to measure the distance based on the signal strength of
4 multiple Wi-Fi access points and knowing where those Wi-Fi
5 access points are. So what you can do is, I drew three Wi-Fi
6 access points out there in blue, green and red. And based on a
7 signal strength, we can calculate a distance from each of those
8 Wi-Fi access points. And if I draw a circle around the Wi-Fi
9 access point from that, of that distance correlating to that
10 signal strength, I can see that all three circles intersect in one
11 point and that point is the believed, the estimated location of
12 where that cell phone is located. Because it can see all three of
13 those access points and it can measure the signal strength
14 from all three of those access points. And that calculation
15 would put it in that area. Now that again requires an exact
16 location of where that Wi-Fi access point is.

17 But there is a third method that does not require the
18 exact location and that's called fingerprinting. And
19 fingerprinting, the way that it works is mainly through the
20 crowdsourcing platform. So again, our phones, the Android
21 phones are constantly collecting GPS coordinates when
22 available Wi-Fi access points and their signal strength. And
23 Google collects all that information and puts it into a database
24 and then can run an algorithm when Google receives only Wi-
25 Fi access points. It can compare that signal strength of the Wi-

1 Fi access points of this device with an unknown location has,
2 query its database using a K nearest neighbor algorithm or
3 some other statistical algorithm.

4

5 THE COURT: I'm sorry?

6 WITNESS D'ERRICO: K nearest neighbor. It's a
7 statistical algorithm that helps you determine when you don't
8 have an exact match where that may be.

9 THE COURT: Based upon where other people have
10 been, historical data?

11 WITNESS D'ERRICO: Exactly, that's exactly right.
12 Historical data from other cell phones that have been in that
13 area that have collected data for Google. And it compares this
14 unknown location that is seeing three or more Wi-Fi access
15 points to all this data that it's collected and looking for
16 somebody that has seen those three Wi-Fi access points at
17 similar strengths and then looking at what their GPS
18 coordinates were at that time. And they can determine an
19 approximate location of where that phone was. And that's
20 called fingerprinting. And you don't necessarily need to know
21 the exact locations down to the centimeter of where that Wi-Fi
22 access point is. All you're comparing are known Wi-Fi access
23 points and the signal strength received by that device. And
24 this data is collected billions of times a day through anybody
25 that has the location services turned on on their Android

1 phone or uses Google's apps on an iPhone.

2

3 BY MS. ULMER:

4 Q So you mentioned the range of a Wi-Fi signal when
5 it's outdoors, do you know what the Wi-Fi signal range is if
6 someone's device is indoors?

7 A It's approximately seventy meters. And that again is
8 very, I think it's very generous. You know, if you walk outside
9 your house with your phone on Wi-Fi, it's going to disconnect
10 from your Wi-Fi shortly thereafter walking outdoors. It could
11 be a few meters away but I don't think you're going to get
12 seventy meters away from your house. That's almost, that's
13 three-quarters of a football field. I don't think you're going to
14 get that far before switching off Wi-Fi. At least I can't at my
15 house.

16

17 MR. MIKULA: I'm going to object. He said seventy
18 feet, or he said seventy meters. I think that answers the
19 question. When you look at his presentation where I think on
20 page 11 of 46, we can move along. My objection just is she
21 asked the question about the distance, he said seventy. I
22 think that answers the question.

23 THE COURT: Do you object to seventy meters being
24 approximately three-quarters of a football field?

25 MR. MIKULA: I don't object to that. Just that –

1 THE COURT: The generosity of the –

2 MR. MIKULA: Judge, my position is, is that he,
3 she's certainly asking questions and he's answering those
4 questions and going on and I'm just trying to move things
5 along. So I think that he answered the question she asked.

6 THE COURT: I do as well. Objection is overruled.

7 MR. MIKULA: Yes, sir.

8

9 BY MS. ULMER:

10 Q You've already mentioned but for data location, how
11 does Google collect that data?

12 A Google collects it mainly two different ways. One is
13 with their Google street cars and the second way –

14 Q This is a picture of a Google street car?

15 A That is a picture from Google's website of a Google
16 street car complete with the cameras on top. And the other
17 way is through the Android phone and the Google Apps
18 platform, which I believe we discussed.

19 Q Can you please explain what a geolocation API is?

20 A Yes, the geolocation API is an application
21 programmer interface. This allows the developer of an
22 application to use Google services in order to determine the
23 approximate or the estimated location of that phone. So
24 Google will ask for certain parameters to be sent to Google in a
25 particular format and then Google will send a response back in

1 a particular format.

2 Q Why would you want to know this information?

3 A Applications want to know where the phones are.

4 So a lot of applications that I've used in the past such as
5 Panera Bread, they want to give you the opportunity to locate
6 the nearest Panera Bread and they do that by determining
7 your location and they can use Google services to do that if
8 they don't have a program to do that on their own.

9 Q And turning to slide fourteen, what is this?

10 A This is the Wi-Fi access point object of this
11 geolocation API. And this is the information that Google is
12 requesting that you provide when querying the geolocation
13 services or the location services when you only have Wi-Fi
14 access points. So it's asking for a MAC address, which is that
15 unique identifier for that access point, the signal strength, the
16 age of when you saw it, so how long ago you saw this. Is this
17 today, is it yesterday? Because we know access points do
18 move. And then the signal to noise ratio. And some of these
19 are optional. The only one that's actually required is the MAC
20 address.

21 Q And when Google responds, what do you receive?

22 A In response back, we receive a location, which
23 contains a latitude and a longitude and then an accuracy in
24 meters of where they believe this device may lie.

25 Q Turning now to Google geolocation, you've already

1 talked about the background and the methodology a little bit
2 but is this, did you guys conduct your own analysis basically
3 or observations of Google location data?

4 A I did. I went out and wanted to compare our actual
5 locations with the Google estimates that they provided using
6 this geolocation API.

7 Q Can you explain the methodology to the Court how
8 you did that?

9 A Yes, absolutely. So essentially, I took a phone with
10 me to determine my actual location and I recorded the
11 coordinates of my actual locations. And then I used a
12 computer and software that was not connected to the network
13 so that Google could not receive any information in advance of
14 this request and I scanned for all of the Wi-Fi access points
15 that were visible to this computer. I collected the MAC
16 addresses and the signal strength as well as some other
17 information. And then I provided this information to Google
18 through their geolocation API and received the coordinates
19 back from Google of Googles estimated location for these
20 points.

21 Q As turning to slide eighteen, you made multiple
22 observations, is that correct?

23 A That's correct.

24 Q Can you please explain slide eighteen observation
25 one?

1 A This is an observation outside the Henrico County
2 Administration Building. The red dot on that chart is my
3 actual location when I conducted the observation. I collected
4 the information, the Wi-Fi information sent it up to Google at a
5 later date and Google returned back to me that the point was
6 located at the green marker and that the accuracy radius is
7 illustrated in the green circle around the point.

8 Q So for observation one, was your observed location
9 within the accuracy circle?

10 A Yes, it was. The observed, the actual distance
11 between Google's estimated location and my actual location
12 was 35 meters. And Google's accuracy was 57 meters, so well
13 within the range.

14 Q Turning to observation two, could you please explain
15 what happened in that situation?

16 A Yes, this was an observation outside the Henrico
17 County Courthouse, pretty much right in front of the front
18 doors illustrated by the red dot. And similar, I collected Wi-Fi
19 information, sent it up to Google using the location API and
20 they returned the position of the green marker with the radius
21 of that circle. And in this case, Google was off. The actual
22 distance was 69 meters. And Google estimated their accuracy
23 would be 48 meters. But in this case, it still puts it at the
24 Henrico County Courthouse. I know that I'm not at Hermitage
25 High School, or Google doesn't estimate them at Hermitage

1 High School or even at the juvenile relations, which are the
2 nearest buildings. It still sees it at the Henrico County
3 Courthouse.

4 Q Turning to observation three, could you please
5 explain where you are at that time?

6 A This time I'm at Parham Doctor's Hospital, down the
7 street from here. The red dot again is where I am. The green
8 dot is Google's estimated location and the ring is Google's
9 accuracy. At this point, the distance between Google's
10 estimate and my location was fifteen meters and their accuracy
11 was up to 74 meters.

12 Q So were you standing within the Google circle of
13 accuracy for observation three?

14 A Yes, I was.

15 Q Okay, going to observation four, could you please
16 explain where you were at that time?

17 A This is an observation on Winchmere Court, which I
18 wanted to make observations in both townhomes and
19 apartment complexes, public buildings and public areas to get
20 a variety of estimates. So this is an apartment complex down
21 the street from, not too far from here, about a mile or so from
22 here. And, you know, again, observation of the red dot, Google
23 returns the green dot and the ring of accuracy is 130 meters.
24 We turned about to be 42 meters from Google's actual
25 estimate, or Google's estimate, excuse me.

1 Q So within the Google accuracy circle?

2 A Yes.

3 Q For observation four, are you still in an apartment
4 complex?

5 A Yes, this is.

6 Q Okay and is it the same apartment complex?

7 A It's across Schrader Road but related complex.

8 Q Can you please explain what happened in
9 observation five?

10 A Observation five, we collected Wi-Fi. My position
11 was at the red dot and the green estimated distance away was
12 about twelve meters from Google, with an accuracy radius of
13 39 meters.

14 Q Again you were within the accuracy circle?

15 A Yes, we were.

16 Q And observation six, could you please explain where
17 you are in observation six?

18 A On Channing Green Court in front of the building
19 marked, between the buildings marked 8401 and 8404
20 indicated by the red dot. Google provided the estimated
21 location, approximately nineteen meters away.

22 Q And is that within the Google accuracy circle?

23 A Yes, it is.

24 Q Turning to observation seven, where are you now?

25 A I'm at Shannon Green Court, which are townhomes,

1 not too far from my last observation. In fact, it's probably
2 about, just looking at the scale on the map, it's probably a little
3 over a hundred meters away, probably yeah, just a little under
4 a hundred meters. And this point has put me, Google's
5 estimate was nine meters away from my actual location and
6 within the circle of accuracy.

7 Q Observation eight, are you still in the apartment
8 complex or what kind of area are you now?

9 A These are townhomes with, on Green Run Drive.
10 And I'm actually on the street in between the two complexes.
11 I'm on the right side of the street as you can see from the red
12 dot. Google provided an estimated accuracy or an estimated
13 distance 21 meters away from my location. And it was inside
14 the 113 meter ring of Google accuracy.

15 Q Turning to observation nine, what kind of area are
16 you in now?

17 A Again some townhomes over on Coachford Court.
18 The red dot indicates my location. Google places its estimate
19 46 meters away from me and it's within the 67 meters that
20 Google has provided for its accuracy.

21 Q Observation ten, are you still in the townhomes or
22 where are you located?

23 A I am. I'm actually only a few meters away from
24 where I was. So my last observation nine, if you look at my red
25 dot and follow that road to the left, I am near the intersection

1 of it's Old West Drive and Coachford Court. I moved just to the
2 other side of that small little townhouse street. And I received
3 an estimated location that was 54 meters away but again
4 inside the 102 meters that Google has provided.

5 Q Observation eleven, where are you?

6 A I'm at the Kroger that's at 9000 Staples Mill Road at
7 the intersection of Hungary Spring Road and Staples Mill Road.

8 Q And again, are you at the red dot?

9 A I am. I'm at the red dot in the center of the parking
10 lot, trying to be further away from Wi-Fi access points.

11 Q Okay and so what happened in this instance?

12 A Google provided an estimated distance that was 71
13 meters away from my location outside of Google's accuracy
14 radius of 58 but still places me inside that Kroger parking lot.

15 Q How many meters was it off, Google accuracy versus
16 where you are?

17 A The accuracy off doing the quick math, thirteen
18 meters.

19 Q Yes.

20

21 THE COURT: Would you mind if I asked a question?

22 MS. ULMER: Yes.

23 THE COURT: So for the difference between
24 observation nine and ten you've indicated that it's a short
25 distance that you moved?

1 WITNESS D'ERRICO: That's correct.

2 THE COURT: But the range of accuracy went from
3 67 meters to 102 meters, is that because of the different Wi-Fi
4 strengths, what increases the accuracy radius?

5 WITNESS D'ERRICO: I did not compare to see if I
6 collected the same Wi-Fi access points from both location nine
7 and ten to see if they saw the same Wi-Fi access points. And
8 again, I don't know exactly how Google comes up with their
9 estimates. All I'm doing here is testing pretty much in a black
10 box, providing it inputs and seeing where it sees that I am.
11 And based off of those tests, I can still see it provides different
12 accuracy radiuses but still in the same general area of where
13 my observation was.

14 THE COURT: Okay.

15

16 BY MS. ULMER:

17 Q Okay, going to observation twelve now, which is
18 slide 29, are you still at the Kroger?

19 A I am at the Kroger and I'm about I think it's about
20 five parking spaces away from the Marketplace side of the
21 Kroger, near Marketplace door.

22 Q And where does Google think you are?

23 A Google places the estimate location, estimated
24 location inside the Kroger or within the footprint of the Kroger,
25 which is 57 meters away from where I actually was and it's

1 outside of Google's accuracy ring.

2 Q By how much outside are you from the Google
3 accuracy?

4 A It's about 15 meters, doing the math on the fly. But
5 again, puts me in the Kroger parking lot, in that Kroger area.

6 Q For observation thirteen, where are you?

7 A I'm in the Kroger parking lot, this time near the
8 pharmacy door, which is just on the other side of the Kroger
9 building. And this time Google provides me an estimate and
10 this was the largest difference that I saw in my testing and it
11 believed that I was 253 meters away towards the top of the
12 shopping center versus near the Kroger door.

13 Q And can I ask you to do some quick math about the
14 difference in the distance?

15 A Yes. That looks like it's 190 meters away.

16 Q And did you compile this into a table, is that on slide
17 31?

18 A I did. That's the table of the locations, the latitude
19 and longitude for each of the points and then it did some
20 calculations here, too. So the actual distance away, which we
21 saw in the slides, the number of BSS IDs, that's the base
22 station identifier, that MAC address. So this is how many MAC
23 addresses I submitted to Google for each location. And then
24 the maximum RSSI, which is the received signal strength
25 indicator, so the strength of the signal. And then I calculated a

1 maximum, a minimum and an average. And the way to read
2 those received signal strength indicators, you'll see that they
3 are all negative numbers. The closer to zero, the stronger the
4 signal. So for example, picking out two signals on here, you
5 know, I'll just take the first line of course the maximum is
6 larger than the minimum, so -58 is a stronger signal than -90
7 on that first line.

8 Q And again, what does that mean to you?

9 A That means, you know, for those signal strengths
10 that are higher, it is much likelier that the phone is nearer to
11 that device. So you can use that fingerprinting algorithm or
12 any of the other algorithms up there to determine the
13 approximate location of that phone.

14 Q In addition to the tests that you yourself conducted
15 and that we've just gone through, are you aware of accurate
16 papers that have also written about Wi-Fi locations
17 themselves?

18 A Yes, I am. And some of those papers are listed for
19 you.

20 Q And you, of course, did your own observations but
21 are you aware of any other studies that have been done by
22 other entities?

23 A Yes, I am.

24 Q And what are those?

25 A There was a study conducted by Oracle, where they

1 developed a system to, it's called a man in the middle. They
2 are looking at the network traffic that's actually coming off of
3 the telephones and that is going to Google so they can
4 determine the exact information that is being transmitted to
5 Google in order to determine the location of the phone.

6 Q And so as part of that study, what are they trying to,
7 what were their findings and what are they trying to do?

8 A Their study was mainly to, it started off to determine
9 if there was any privacy implications with smart phones. And
10 they were looking at data and they came across this data as
11 they were conducting their research.

12 Q And what was the finding of the study?

13 A That the information that came off the phone –
14

15 MR. MIKULA: I'm going to object. This is hearsay,
16 Judge. I think if he can provide the actual study and submit
17 that into evidence by way of witness, then they can but that's
18 hearsay.

19 THE COURT: Do you care to be heard on it?

20 MS. ULMER: Yes, sir. Judge, I believe that as an
21 expert he can rely on other studies and other knowledge so he
22 can testify as to what his knowledge of other studies are and
23 he can, of course, be cross examined on that but it is
24 something that he is aware of as an expert and he can testify
25 as to what he knows.

1 THE COURT: I believe that he can testify based
2 upon what the data showed but not what the opinion of the
3 person who authored the data is. So I don't believe that this
4 witness is testifying as to what the opinion is but basically
5 what the data showed. So I overrule the objection.

6

7 BY MS. ULMER:

8 Q Can you please tell us what the data showed?

9 A The data showed similar to what the geolocation API
10 contained. It showed information such as Wi-Fi access point,
11 BSSIDs or MAC addresses and signal strengths being
12 transmitted to Google as well as the GPS coordinates, part of
13 their collection platform. And in return Google was sending
14 back an estimated latitude and longitude and estimate radius
15 for those coordinates.

16 Q Was the data collected by the study similar to the
17 data that they later received from Google?

18 A Yes, it was.

19 Q Turning now to, you've already mentioned that you
20 testified three times about Google location services in Henrico
21 County, was that in the Commonwealth versus Denise and
22 LaToya Gay cases?

23 A Yes, it was.

24 Q All right and can you please explain to the Court a
25 little bit of the background of that case and what you were

1 asked to do?

2 A Yes.

3

4 MR. MIKULA: I'm going to object to the relevance as
5 to what happened in another case. I don't know how that's
6 applicable here in terms of the reliability of this information.
7 It's a separate case, a separate fact pattern, I don't know the
8 relevance.

9 THE COURT: Does it make a difference as to what
10 he did and he was determined to be an expert in those cases
11 and you'd stipulate to that Mr. Mikula?

12 MR. MIKULA: Well, I stipulated as to his expertise
13 with regard to the cell phone data.

14 THE COURT: Do you concur that he was
15 determined to be an expert in those previous cases?

16 MR. MIKULA: I don't have any objection to that.

17 THE COURT: And he testified as an expert in those
18 cases, do you agree with me?

19 MR. MIKULA: I agree with that, sir.

20 THE COURT: Okay, so what is it that you are
21 asking Special Agent D'Errico to testify to as to the previous
22 cases?

23 MS. ULMER: In those previous cases, your Honor,
24 the reason why we are here is whether or not this information
25 is inherently unreliable or if it can be presented to the Jury.

1 This case in particular, what I'm hoping to show through Agent
2 D'Errico is going to whether or not the Google information is
3 reliable and what he knows and I believe that is a direct issue
4 in this case.

5 THE COURT: Well, doesn't that go to the weight of
6 the evidence? Isn't it basically that he testified and the finder
7 of fact made its determination based upon the testimony of the
8 witnesses?

9 MS. ULMER: Well and they did ultimately, I don't
10 know exactly, you know, obviously was not in the Jury Room,
11 Judge, to know what weight they gave it. But I think it's
12 relevant for your Honor to see that in another case with Google
13 location services, the accuracy of that information that was
14 provided it has great weight onto the accuracy of the
15 information before your Honor today in regards to Mr.
16 Anderson's case.

17 THE COURT: But everything goes to the weight.

18 MS. ULMER: Well, Judge, in the Denise and Latoya
19 Gay case there is specific corroborations to the Google location
20 information that was available in the Gay case but was not
21 necessarily available in the case before your Honor. So I think
22 it is important for the Court to see that in another case in
23 Henrico where we have the exact same type of information how
24 it can be corroborated and how it was corroborated in that
25 case and thus the information is reliable in this case and

1 should be admitted into evidence.

2 THE COURT: What I believe I'm hearing you say is
3 that the Special Agent testified to Google location services in
4 these previous cases.

5 MS. ULMER: Yes.

6 THE COURT: And there was independent evidence
7 to show the corroboration?

8 MS. ULMER: Yes, sir.

9 THE COURT: So why does he need to go through all
10 these slides as opposed to say it was my opinion that it was
11 located here and then the evidence that was independent
12 showed that it was either exactly or close by or in the same
13 town or anything like that, why do we need to go through these
14 slides?

15 MS. ULMER: Well, Judge, if we're willing to have the
16 Defense stipulate that it was extremely accurate, then I have
17 no issue with that. However, if he is not willing to stipulate, I'd
18 rather go through the slides to show that when Google says
19 that, for instance, Denise Gay is at one particular location and
20 something else shows that at that exact same time she was at
21 that location. If Mr. Mikula is willing to stipulate that the
22 evidence was corroborated that the Google location was
23 corroborated exactly, then I have no issue. I don't need to go
24 through the slides.

25 THE COURT: Does this Special Agent, is he able to

1 testify as to the corroborated testimony?

2 MS. ULMER: Yes, sir. That's what he's testified to
3 in the Gay case.

4 THE COURT: Why can't he, then do you agree Mr.
5 Mikula he could say my Google location services had this and
6 that the corroboration testimony had the location dead on,
7 outside the zone or anything like that? I just don't know that I
8 need to, we need to go through these slides to get to that point.
9 I think that, do you agree with that Mr. Mikula?

10 MR. MIKULA: I don't know if, I mean I think that
11 he, they are certainly doing what they need to do in terms of
12 showing how it is reliable and it's our burden, well not our
13 burden but it's our duty to certainly cross on issues that's
14 already been presented to the Court. How, we're left to assume
15 a lot in terms of what happens in a separate case and so –

16 THE COURT: Let me think about it this way. If we
17 hold on this, if on cross examination it gets to that issue, then
18 on redirect you can ask the Special Agent more particular
19 questions. Fair enough?

20 MR. MIKULA: That's fine.

21 MS. ULMER: Yes, Judge.

22 THE COURT: Okay.

23 MS. ULMER: Judge, am I allowed to ask a general
24 question about the Gay case?

25 THE COURT: It depends on what the general

1 question is.

2 MS. ULMER: Okay.

3 THE COURT: You can try.

4

5 BY MS. ULMER:

6 Q In the Denise and Latoya Gay cases, were you able
7 to corroborate the Google location data you received with other
8 evidence such as her bank statements?

9 A Yes, we were.

10 Q And that data from the Google location, the Google
11 location data, was that accurate with what you saw in her
12 bank statements of her location?

13 A Yes, it was. It provided the estimated location of
14 where she was, which matched Google's estimation.

15 Q Okay, let's turn to slide 38.

16

17 THE COURT: May I ask one other question?

18 MS. ULMER: Yes, sir.

19 THE COURT: The Commonwealth has allegations
20 that this Defendant was at certain locations, is that correct?

21 MS. ULMER: Yes, sir.

22 THE COURT: Has this Special Agent gone to those
23 specific locations and done the independent analysis to
24 determine whether or not that he's within or outside of the
25 zone of accuracy?

1 MS. ULMER: Well, Judge, that's what we are getting
2 to. He did not go back out with the cell device. However,
3 similar to the Gay case, we have other evidence that will be
4 presented to your Honor that corroborate the Google location
5 data with where Mr. Anderson was.

6

7 BY MS. ULMER:

8 Q All right and the Roland Anderson case,
9 approximately how many data points did you receive?

10 A 2,608 data points.

11 Q And what was the timeframe for those points?

12 A October 12th, 2017 from 8:01:24 p.m. to October 16,
13 2017 7:59:51 p.m. in Eastern Daylight Time.

14 Q And so that is when you converted from UTC to
15 Eastern Daylight Time?

16 A That's correct, yes.

17 Q And we've already gone over the different fields that
18 you received in that data. So turning exactly to slide 39, what
19 does this slide show?

20 A Slide 39 shows the Google location points that
21 Google provided between the time of 11:58 a.m. and 1:44 p.m.
22 on October 15, 2017.

23 Q And what do the blue balloons mean?

24 A The blue markers indicate that the source of that
25 data as marked by Google was Wi-Fi.

1 Q And what about the red ones?

2 A And the red balloon is GPS as provided by Google.

3 Q And what is this location?

4 A This location is, the general location is the Kings
5 Point Apartments. The yellow marker indicates where Mr.
6 Anderson's residence was in apartment B and the crime scene
7 location in the same building in apartment H.

8 Q And so what does the slide mean to you?

9 A The slide indicates to me that the mobile device was
10 at this apartment complex between the times of 11:58 a.m. and
11 1:44 p.m.

12 Q Turning to slide forty, what is this, is this Google
13 location information you received?

14 A This is. Between the times of 10:22 a.m. to 10:37
15 a.m.

16 Q And again, what is the blue marker?

17 A The blue markers are Google location history data
18 points marked with a Wi-Fi source.

19 Q And what about the green?

20 A And the green is Google location history records
21 marked with a cellular source.

22 Q And what is the, you said the times are 10:22 a.m.,
23 where is the first point at 10:22 a.m.?

24 A The first point is near Mr. Anderson's residence,
25 near the apartment complex.

1 Q And for the record, can you explain the travel and
2 the timing of these different data points?

3 A Yes. So you can see in sequence the data points are
4 moving up Laburnum Avenue and make a left turn, I'm not
5 familiar exactly what that street is but it ultimately leads down
6 to the Kroger. And in this case, you can see the green
7 markers, the times are shaded a little darker and they are not
8 included in the sequence because the error radiuses were
9 nearly 1300 meters for that. So that point in particular would
10 put that device in the 1299 meter radius circle, which doesn't
11 really help with the accuracy of this information. So I added it
12 for completeness but I'm relying on the Wi-Fi because they
13 have a much smaller accuracy range.

14 Q What is the accuracy range?

15 A It's between 22 and 98 meters for each of those
16 points.

17

18 THE COURT: And that's the blue?

19 WITNESS D'ERRICO: That's the blue points,
20 correct.

21

22 BY MS. ULMER:

23 Q Were you able to corroborate this travel pattern
24 using any other information provided to you by the
25 Commonwealth?

1 A I was, yes.

2 Q And that is slide 41?

3 A That's correct.

4 Q What is that?

5 A This is an overlay of the Google information that we
6 just saw on the last slide with the red marker or the red
7 markers, which is RTT data, it's a tool that Verizon uses to
8 determine the approximate location of phones. And in this
9 case, we are looking at the victim's phone, the victim's phone
10 records. So in this case, up near points three and four, there
11 are two records provided by Verizon; one at 10:27:46 and one
12 at 10:27:51 that indicated that the phone, that Google
13 approximates the phone was located at that location inside the,
14 it's difficult to see but it's kind of like a red band. In this
15 example, it's pretty much directly next to the cell tower and the
16 cell towers are illustrated by the red dots on the map, the small
17 red dots with the wedges originating out. And that shows us
18 our direction from a cell phone that Verizon believed that
19 phone was positioned in at that time.

20 Q So are the, was the victim's phone and the Google
21 location data similar?

22 A They are. They're actually in sequence all the way
23 through.

24 Q Turning now to the Kroger itself, what was the
25 information we received from Google?

1 A Between 10:37 a.m. and 10:47 a.m., Google
2 provided these ten points. Two of them were GPS points.
3 Eight of them were Wi-Fi points. And it provides that the
4 phone was in the area of the Kroger between those times.

5 Q And there are blue balloons and then there is a red
6 balloon. What is the red balloon there?

7 A The red balloon is the GPS as well as the rings
8 around it illustrate the accuracy range for those GPS points.
9 So that smaller circle in there represents six meters and the
10 larger circle is 23 meters of accuracy for those GPS points.

11

12 MS. ULMER: Your Honor, at this time, the
13 Commonwealth would like to admit three photos into evidence,
14 which are from the Kroger surveillance for the purposes of the
15 record. It shows Mr. Anderson entering at 10:39:28 and it
16 shows him exiting at 10:47:49 and then that second photo of
17 him exiting at that 10:47:51.

18 MR. MIKULA: We have previously stipulated.

19 THE COURT: Any objection?

20 MR. MIKULA: No, sir.

21 THE COURT: The photographs will be collectively
22 Commonwealth's number Two.

23

24 NOTE: Commonwealth's Exhibit 2.

25

1 THE COURT: Before I forget, if we don't get to the
2 issues having to do with the Gay case on cross, how are you
3 going to have those slides that were not addressed redacted
4 from the DVD that's been introduced into evidence?

5 MS. ULMER: Judge, I have a copy on my desktop of
6 the presentation. I'm happy to go and delete whatever slides.

7 THE COURT: Any objection to that, Mr. Mikula?

8 MR. MIKULA: No, sir.

9 THE COURT: Okay.

10 MS. ULMER: Your Honor, as Commonwealth's
11 Exhibit number Three, we'd like to enter into the record that
12 ECO ATM receipt, which shows Mr. Anderson entering the
13 victim's cell phone on October 14, 2017 at approximately
14 10:39:23 at the Kroger, Commonwealth's Exhibit number
15 three.

16 THE COURT: Have you seen that as well, Mr.
17 Mikula?

18 MR. MIKULA: I have.

19 THE COURT: Any objection?

20 MR. MIKULA: No objection to that.

21 THE COURT: Commonwealth's number three,
22 without objection.

23

24 NOTE: Commonwealth's Exhibit 3.

25

1 BY MS. ULMER:

2 Q Did Google also send location information about a
3 Tweeter Court address?

4 A Yes, it did, yes.

5 Q And if you could explain what is before us?

6 A Yes, the points mapped are between 1:30 a.m. and
7 3:51 a.m. on October 15th, 2017. And they put it, they put the
8 phone in the vicinity of 6308 Tweeter Court in Richmond,
9 Virginia.

10 Q And as part of your analysis, did you also analyze
11 Mr. Anderson's cell phone?

12 A Yes, I did.

13 Q Did you find any text messages that corroborate Mr.
14 Anderson being in that general location at that time?

15 A I did. I found two text messages on Mr. Anderson's
16 phone. One sent from Mr. Anderson at about 1:14 a.m. and I
17 apologize, let me explain the dates. This is directly from the
18 Celebrite report. And Celebrite uses a European date format.
19 So while it's marked 15/10/2017, it's actually October 15,
20 2017. The first message reads, I'm at yo crib. And he receives
21 a message back from Keon, and Keon is the name that is in
22 Mr. Anderson's phone that's associated with that telephone
23 number that was texted to and from. At 1:23:59 a.m. saying,
24 about to pull up in about five to seven.

25 Q On this slide, it looks like it says Keon Vaughn, how

1 did you come by that information?

2 A I used a public record search based on that
3 telephone number to derive the name and address associated.

4 Q Where does Keon Vaughn live?

5 A 6308 Tweeter Court, Richmond, Virginia.

6 Q And in regards to the Google map itself where is
7 6308 Tweeter Court, Richmond, Virginia?

8 A It is where that arrow is pointing, which appears to
9 be in the middle of many of the markers on there.

10 Q And the markers that are on there, are they both
11 GPS and Wi-Fi markers?

12 A Yes, they are with the blue being the Wi-Fi and the
13 red being the GPS.

14 Q In the Google location information that you were
15 given, does it show a trip to Chippenham Hospital?

16 A Yes, it does.

17 Q And when was that?

18 A Between 3:51 a.m. and 4:03 a.m. on October 15,
19 2017.

20

21 MS. ULMER: Your Honor, at this time I'm going to
22 take a pause from the presentation and play a previously
23 stipulated jail call.

24 THE COURT: Any objection?

25 MR. MIKULA: No, sir.

1 THE COURT: All right.

2

3 NOTE: AN AUDIO RECORDING IS PLAYED BEFORE THE
4 COURT.

5

6 MS. ULMER: Your Honor, the Commonwealth
7 would like to admit the jail call as Commonwealth's Exhibit
8 number four.

9 THE COURT: Any objection?

10 MR. MIKULA: No objection.

11 THE COURT: The jail call will be Commonwealth's
12 number four.

13

14 NOTE: Commonwealth's Exhibit 4.

15

16 BY MS. ULMER:

17 Q Okay and going back to the Chippenham Hospital
18 slide, slide 44, the Google location points, are they Wi-Fi, GPS
19 or cell tower points?

20 A Eight of the points are from Wi-Fi and one of the
21 points is from a cellular signal.

22 Q And finally, did you receive geolocation information
23 regarding a Bradbury Road address?

24 A Yes, I did. I received Google location points in that
25 vicinity yes.

1 Q And what type of points are those?

2 A It's a mix between GPS points and Wi-Fi points.

3 Q And do you know the owner of 8150 Bradbury
4 Road?

5 A According to real estate records, it's Roland
6 Anderson, different than the Defendant Roland Anderson.

7 Q Not Roland Anderson III, but another Roland
8 Anderson?

9 A Correct.

10 Q And you mentioned multiple times throughout your
11 report that and throughout the presentation that's it's based
12 on academic, your knowledge with academic journals and
13 other studies, have you listed all resources for his Honor?

14 A Yes, I have.

15 Q Okay and that is the next two slides?

16 A That's correct.

17

18 MS. ULMER: Your Honor, if I could have a brief
19 moment. Judge, the Commonwealth would pass the witness.

20 THE COURT: Cross?

21

22 CROSS EXAMINATION

23 BY MR. MIKULA:

24 Q Remind me again of the pronunciation of your last
25 name.

1 A D'Errico.

2 Q D'Errico. Mr. D'Errico, a few questions. In terms of
3 the CAST presentation that you created, on page eight you had
4 made comments regarding the accuracy. That information,
5 now you created this presentation, is that correct?

6 A Yes, I did.

7 Q Okay, but you pulled some of this information from
8 Google's website, is it fair to say?

9 A Yes, I did.

10 Q And the accuracy summary, that was derived from
11 Google themselves, correct?

12 A If I could view the slide.

13 Q Page eight.

14 A Your Honor, I have a copy here if you don't mind.

15

16 THE COURT: Okay, page eight.

17 WITNESS D'ERRICO: And can you ask that
18 question again, please?

19 THE COURT: Sure. On page eight, where it says
20 accuracy, you took that from what Google gave you, is that the
21 question? MR. MIKULA: That's my question.

22 THE COURT: Okay.

23 WITNESS D'ERRICO: That is correct. This is
24 directly from a leaflet that Google uses as marketing material.

25

1 BY MR. MIKULA:

2 Q Okay and as part of that marketing material, you
3 said that Google obviously is profit seeking, correct?

4 A Yes.

5 Q And a major source of that profit is advertising
6 purposes, fair to say?

7 A Yes.

8 Q Okay. With regard to and you testified as well and
9 you gave a hypothetical Petco versus PetSmart, do you
10 remember that hypothetical?

11 A Yes, I do.

12 Q Okay and you said in some instances let's say if
13 Petco gives, pays money to Google, they'll offer certain
14 discounts so that people that are close to PetSmart will instead
15 go to Petco or something to that effect, is that fair to say?

16 A That's fair, yes.

17 Q Okay, so you're basically saying that Google is
18 willing to manipulate the consumer to come to a specific
19 person?

20 A What I'm saying in that case is Google is willing to
21 push out ads on behalf of their client. And Google is not
22 determining the radius or where those ads are being pushed
23 out to, Google's client is, PetSmart in that case.

24 Q Correct but my point is, is that Google will receive
25 money from people and they will in a sense look at where their

1 location is, determine where potential client is and tell the
2 client location that might be further or closer, is that fair to
3 say?

4 A I'm sorry, I'm not understanding your question.

5 Q What I'm asking is, you said the hypothetical Petco
6 versus PetSmart.

7 A Yes, sir.

8 Q Let's assume PetSmart is closer to a consumer.
9 Petco is further away. But Petco pays Google money, will
10 Google in your understanding and your background and
11 expertise, will they tell a consumer to go to the further distance
12 one if that person is paying them money?

13 A I don't know that Google tells them. Google has an
14 ad platform and Google certainly pushes out ads on behalf of
15 their clients. And what those ads contain, I don't believe that
16 Google has full control. Of course, they have guidelines of
17 what can be in those ads, but I don't know that they, that
18 Google themselves are creating those ads rather than, in my
19 example as I was discussing, the client can develop a radius or
20 an area where they would like users targeted for those ads.

21 Q Okay. I'll move on. With regard to you said the
22 history of obviously cell triangulation, Wi-Fi and GPS, that
23 predates using Google to get that information, is that fair to
24 say?

25 A Yes, it does.

1 Q Okay, so it's relatively recent that the FBI and other
2 experts in the field have been using Google to generate this
3 data?

4 A Recent, more recent than –

5 Q More recent than other ways in which to get the
6 information that you've used previously?

7 A It is, yes.

8 Q And historically it was some, Google was used for
9 purposes of a consumer, in other words my question is, is to
10 your understanding Google is historically and has created, I
11 should say this. Has Google historically been used as a person
12 finder, a forensic tool or has that been a recent development?

13 A I don't know the first time that the FBI or any law
14 enforcement agency approached Google. So I don't have that
15 information. I can tell you that I've used it multiple times in
16 the last year if not two years.

17 Q Okay, when is the first time you testified in a case
18 using Google location services?

19 A December 2017.

20 Q Okay. And to your knowledge, Google has been
21 using location services prior to December of 2017, is that
22 correct?

23 A That's correct.

24 Q When did that first start?

25 A I don't know. As I mentioned in the presentation,

1 they added it to their privacy policy in 2009. I don't know
2 exactly when they started using it, though.

3 Q So your testimony is you don't know when Google
4 first used location services?

5 A I don't know the exact date, no I don't.

6 Q Okay. With regard to location services, you also
7 testified it's tied in to not just Gmail but other applications in
8 Google is that fair to say?

9 A That's correct, yes.

10 Q Okay and depending upon the type of let's say
11 phone, is it built into let's say a Samsung Galaxy, versus you
12 have to download it if you have an iPhone?

13 A Well, a Samsung phone typically runs the Android
14 operating system. And this setting is in the Android operating
15 system. The applications are used more so on the iPhone
16 platform, which a user would have to download those
17 applications such as Gmail or Google maps, do not natively
18 come on an iPhone when you purchase it new from a store.
19 Did that answer your question?

20

21 THE COURT: It's embedded in the Galaxy, in the
22 Samsung phone but it's not embedded in the iPhone?

23 WITNESS D'ERRICO: That's correct. It's embedded
24 in the operating system, the actual operating system. So there
25 is no apps to download if you are using an Android based

1 phone, which Samsung creates an Android based phone.
2 There is a setting to turn it off in the Android operating system.
3 However, during the setup of those Android phones it asks if
4 you want to collect this data and in my experience, I am in a
5 rush to set up my new phone because I'm very excited and yes,
6 yes, yes, yes, click through just about everything.

7

8 BY MR. MIKULA:

9 Q Okay, now you testified regarding the, I guess, the
10 building blocks of Wi-Fi technology. And in that testimony you
11 talked about the MAC address, do you recall that?

12 A Yes.

13 Q Okay and you identified the MAC address as the
14 machine access control, is that correct?

15 A Yes.

16 Q Is it in fact called the media access control?

17 A You are correct, yes, I did misspeak there.

18 Q Okay.

19

20 MR. MIKULA: Regarding this Google data that I
21 think has been previously marked and identified and moved
22 into evidence as Commonwealth's One, do you have that able
23 to be pulled up?

24 MS. ULMER: No.

25 MR. MIKULA: Okay. Judge, for demonstrative

1 purposes, I printed off the raw Google data that's been
2 previously provided by the Commonwealth's Attorney's office
3 and I can provide one to the witness as well.

4 THE COURT: Any objection?

5 MS. ULMER: No, sir, your Honor.

6 THE COURT: All right.

7 MR. MIKULA: And I'd like to pass one up to the
8 Court as well.

9 THE COURT: Thank you. At this point in time it's
10 just for demonstrative purposes?

11 MR. MIKULA: Yes, sir.

12 THE COURT: Not an exhibit?

13 MR. MIKULA: No, sir.

14 THE COURT: Okay.

15 MR. MIKULA: It's previously been moved in as an
16 exhibit.

17 THE COURT: Is that part of the disk that was in?

18 MR. ACKLEY: I think it is.

19 MS. ULMER: It is the disk.

20 THE COURT: The disk is number one?

21 MR. MIKULA: Yes, sir.

22 THE COURT: Okay.

23 MR. MIKULA: Yes, sir.

24

25 BY MR. MIKULA:

1 Q Sir, can you please identify that set of documents,
2 those pages you have in front of you?

3 A Yes, it appears to be a printed copy of the Google
4 location history.

5 Q Okay and that is, you have 59 pages, is that correct?

6 A Yes, sir, I do.

7 Q Okay. There are a number of columns in this
8 document is that correct?

9 A Yes, there are.

10 Q Okay, I'm going to ask you about each column and
11 have you explain what it means. You had testified previously
12 about the first column, which is UTC, correct?

13 A Yes, I have.

14 Q And remind me again of what UTC stands for?

15 A It's Universal Time Coordinated. It's not necessarily
16 a time zone but it's a time that actually marks up with
17 Greenwich Mean Time for purposes of time zone. So that we
18 can shift time zones off of there.

19 Q Okay and the second and third columns, what are
20 those?

21 A Column B and column C are marked latitude and
22 longitude, which is the coordinates of Google's estimated
23 location.

24 Q And that's a global positioning term is that fair to
25 say, that those are global positioning terms?

1 A Yes, they are.

2 Q Okay and the fourth column, what is that?

3 A The fourth column, column D is marked display
4 radius meters and that is Google's accuracy radius back to us.

5 Q Okay and for people that are not familiar with the
6 metric system, how long is a meter in feet?

7 A It is just shy of three feet, so roughly equivalent to a
8 yard, I don't have the exact –

9 Q Does it maybe is it 3.2 feet would you say, does that
10 sound familiar?

11 A It may be.

12

13 THE COURT: About 39 inches or so?

14 MR. MIKULA: I think the Court can take judicial
15 notice that a meter is 3.2 feet approximately.

16 THE COURT: There are less meters in a football
17 field than there are yards?

18 MR. MIKULA: That's correct, yes, sir.

19 THE COURT: Okay.

20

21 BY MR. MIKULA:

22 Q And the next column, what is that?

23 A The next column, column E is the source column.

24 Q Okay and what's contained in the source column?

25 A In this document there are four different values in

1 that source column. It's Wi-Fi, GPS, cellular and unknown.

2 Q Okay and device tag, what is that?

3 A I don't have an official definition of what the device
4 tag is. I'm unaware of what that column is.

5 Q You don't have, in terms of all your hours and
6 experience in this type of field, you can't, you don't know what
7 it is?

8 A No. I can guess what it is but I can't tell you with
9 any certainty what it actually is.

10

11 THE COURT: Okay, would it be fair to say that for
12 all the entries within the 59 pages the device tag is the same
13 Mr. Mikula?

14 MR. MIKULA: Yes, sir.

15 THE COURT: It would have something to do with a
16 device?

17 MR. MIKULA: I believe it identifies the device itself,
18 yes, sir. But again that's –

19 WITNESS D'ERRICO: And I can offer that in other
20 cases that device tag does not show up in any other case that
21 I've worked. It is a different identifier for each set of data that
22 I've analyzed.

23 MR. MIKULA: I'd ask that be stricken from the
24 record. I didn't ask that.

25 THE COURT: Okay, we'll strike that.

1 MR. MIKULA: Thank you.

2

3 BY MR. MIKULA:

4 Q What is the last column please?

5 A The last column is the platform column and it
6 describes the mobile device that was used as the source of this
7 data.

8 Q Okay. Going to let's see, so if you take for instance
9 columns B and C, which are marked as latitude and longitude
10 and you can take those figures, those numerical, I guess, the
11 numbers that are in B and C and you can plot a location point
12 on a map, fair to say?

13 A Yes.

14 Q Okay and going back to column D that's marked as
15 display radius in meters, is that fair to say?

16 A Yes, it is.

17 Q Okay, now when it says it's a radius, does it mean a
18 distance from that point you would plot on a map, like a
19 longitude and latitude to the outer edge of a radius?

20 A It is a, with the latitude and longitude being the
21 center point of a circle, this is the radius away, the amount of
22 meters aware that that circle should be drawn?

23

24 THE COURT: So the diameter is twice the radius?

25 WITNESS D'ERRICO: That is correct, yes.

1 THE COURT: From the point, got it. All right.

2

3 BY MR. MIKULA:

4 Q On row six, can you tell the Court what the display
5 radius is on row six?

6 A On row six, the display radius is 23 meters.

7 Q Okay and so as the Court just set forth double that
8 in meters would be the diameter, is that fair to say?

9 A That's correct, yes.

10 Q Okay and so based on what you testified previously,
11 that the positioning could really be within, it could be as far
12 north as 23 meters from that point of latitude and longitude, it
13 could be as far south as 23 meters, is that fair to say?

14 A That's correct, yes.

15 Q And as far west and east?

16 A As Google's estimation is, it would be somewhere in
17 that circle, that is correct.

18 Q Okay and you testified previously that an area let's
19 say of 180 feet can't put a specific, you can't put a specific data
20 point within let's say an apartment or a car, is that fair to say
21 with the Wi-Fi data?

22 A Correct, using a single data point, or a single Wi-Fi
23 data point, I cannot tell you which apartment that mobile
24 device was originating out of. This information provides an
25 approximate location of that device, not a specific pinpoint

1 location of that device.

2 Q Okay. The disclaimer that's on row two, do you see
3 that?

4 A Yes, I do.

5 Q Can you read that for the Court, please?

6 A Yes, the map display radius fields reflects an
7 estimated uncertainty value regarding the reported coordinate.
8 Its value depends on a great many factors and is an
9 approximation sufficient for its intended product use.

10 Q The phrase reported coordinate would that be
11 latitude and longitude?

12 A Yes, it would.

13 Q Okay, can you tell the Court what Google considers
14 quote, a great many factors as being?

15 A I would have to assume here.

16

17 THE COURT: Don't guess.

18

19 BY MR. MIKULA:

20 Q So you don't know?

21 A I don't know exactly what a great number of factors
22 may be.

23 Q And you don't know how accurate or inaccurate
24 each would be, fair to say?

25 A Purely from the records, that's correct.

1 Q Okay. Do you know if Google considers weather a
2 factor, for instance?

3 A I don't know if they consider it.

4 Q When you see row four through eight, they all read
5 23 meters, is that fair to say?

6 A Yes.

7 Q Can you tell us with any scientific certainty if that
8 figure is accurate?

9 A Accurate as?

10 Q Is it 23 meters or could it be a different amount?

11 A I'm sorry, I don't know what you're asking. Can you
12 rephrase the question?

13 Q Well, I don't know –
14

15 THE COURT: I think the question is, you don't
16 know from looking at rows four through eight as to those
17 particular entries whether the 23 meters is accurate or not, is
18 that your question?

19 MR. MIKULA: Yes.

20 WITNESS D'ERRICO: I don't know that it's one
21 hundred percent accurate.
22

23 BY MR. MIKULA:

24 Q Okay, can you tell us how much variation of error
25 there would be in the uncertainty value?

1 A Based on my own testing, I found these records to
2 be quite reliability up in the seventy percentile and beyond. If
3 it was not accurate, as in if it was a miss, if I doubled the
4 distance of that accuracy radius, ninety percent were in that
5 radius.

6 Q Does it depend on whether it's GPS, Wi-Fi or cell
7 triangulation?

8 A I can tell you the GPS appeared to be more precise
9 as in they have a much smaller radius but the accuracy of
10 them being in that accuracy bubble, I believe are the same. I
11 did not go out and test GPS specifically.

12 Q So the answer is yes, it can depend upon what
13 source it comes from?

14 A The precision certainly, yes.

15 Q Okay.

16 A The precision certainly depends on the source of the
17 data.

18 Q Have you spoken to Google engineers or developers
19 about how to calculate that uncertainty value?

20 A No, I have not.

21 Q Okay, you testified previously that an average range
22 for a Wi-Fi data point is 250 meters if it's outside?

23 A I wouldn't say outside. That's not the average.
24 That's the maximum distance.

25 Q The maximum distance, okay.

1 A Correct.

2 Q And what's the maximum distance indoors?

3 A The paper said 70 meters.

4 Q And what paper is that?

5 A I'd have to refer back to my, do you mind if I refer
6 back to one of the slides?

7 Q Sure.

8

9 THE COURT: Page eleven?

10 WITNESS D'ERRICO: I do not believe I list the
11 source in my sources document here but I can certainly add
12 that in. I have the information on my laptop but not in this
13 presentation.

14

15 BY MR. MIKULA:

16 Q So you testified as to the maximum, do you have an
17 idea as to what an average would be?

18 A You know, from an actual scientific perspective, I
19 don't have an average. It depends on many factors such as the
20 amount of power that's in that Wi-Fi radio.

21 Q What type of router it would be?

22 A The type, the design of the router. So each router
23 can be a little different based on how far it can transmit.

24 Q How many different routers would you say are on
25 the market today?

1 A I have no way to estimate that. I don't know, many.

2 Q How many are you familiar with?

3 A I know of at least six companies that manufacture
4 routers that sell routers, they have many models from that.
5 You know, I don't have an exact number. I mean I could say
6 there is over a hundred, I don't have an exact number.

7 Q So you know of at least over a hundred, is what your
8 testimony is?

9 A Well, there are likely over a hundred different
10 routers, models and manufacturers out there. I don't have an
11 exact listing of every router out there though.

12 Q Okay. With regard to, let's go to row 167 on this
13 data exhibit. Tell me when you get there, please.

14 A Bottom of page four, is that correct?

15 Q Yes, sir.

16 A Yes, I'm there.

17 Q Okay, can you tell the Court what Google is saying
18 the display radius in meters that is?

19 A 2,045.

20 Q Okay and if we are to assume that there are three
21 feet in a meter, is it fair to say it's over twelve or thirteen
22 thousand feet radius, correct? I'm sorry, that's the diameter, I
23 was an English major.

24

25 THE COURT: Two thousand times three, it would be

1 around six thousand.

2

3 BY MR. MIKULA:

4 Q About 6500, is that fair to say, the radius?

5 A Approximately, that's fair.

6 Q Are you familiar with a router that can pick up the
7 signal that's that far away?

8 A Unless it's highly modified, I don't know of a router
9 than can do that.

10 Q Okay. Look at the next row if you could, 168, what
11 does the display radius say there?

12 A 1,635 meters.

13 Q Similarly you can't testify you are familiar with a
14 router than can pick that signal up, fair to say?

15 A Other than one that's highly modified, correct.

16 Q In your experience, what's the furthest distance that
17 you're familiar with that a Wi-Fi router can pick up a signal?

18 A There was an experiment done at Black Hat in Las
19 Vegas where they beamed a Wi-Fi signal into the desert.

20 Q I'm asking you in your experience.

21 A I don't have an exact.

22

23 MS. ULMER: Judge, objection. He was answering
24 the question that is his experience, it's his knowledge of the
25 setting.

1 THE COURT: Well, I guess the question is, is the
2 question how far has he actually beamed a Wi-Fi signal?

3 MR. MIKULA: Yes, yes, sir.

4 WITNESS D'ERRICO: I don't have an exact figure.
5 You know, once I leave my house, my Wi-Fi pretty much, my
6 phone turns off Wi-Fi and goes to cellular. You know, outside
7 of my house, I don't know, fifty meters.

8

9 BY MR. MIKULA:

10 Q Okay.

11 A Usable.

12 Q Right, okay, so anything over fifty meters is, are you
13 saying somewhat suspicious?

14 A No, I'm saying my phone turns off at maybe
15 approximately fifty meters from my routers being inside. That
16 doesn't mean that the signal is not viewable or out there. It
17 just might mean that it's not usable or it's at such a degraded
18 capability that my phone would rather turn onto say LTE or
19 the cellular networks. I'm not conducting traffic, you know,
20 more than fifty meters from my house on my Wi-Fi.

21 Q Okay, all right.

22 A But I guess to finish that what I'm saying is that
23 signal may still be visible past fifty meters. It just might not be
24 usable.

25 Q Okay.

1 A If you're trying to connect to your Wi-Fi.

2 Q For a usable signal, what do you see in a standard
3 observation presentation that you created here in this case?

4 A Sir, I'm sorry, I need to clarify. Are you asking what
5 a Wi-Fi router can do or what Google has provided when
6 marked as Wi-Fi?

7 Q Fair point, what a Wi-Fi router can do in terms of
8 the distance that you generally see as a maximum?

9 A I don't collect information on the distances from Wi-
10 Fi. I've collected signal strengths but I haven't collected
11 distances from a Wi-Fi router. So I don't have any information
12 to provide.

13

14 THE COURT: Do you mind if I asked a question?

15 MR. MIKULA: Yes, sir.

16 THE COURT: Are you saying that there is a
17 difference between what might show up as being a signal mark
18 on this spreadsheet and what someone may be able to use his
19 or her phone as far as making a call is concerned?

20 WITNESS D'ERRICO: Yes, I am. I don't believe –

21 THE COURT: So someone couldn't make a call but
22 it might show up as a hit or a printout for that particular time
23 and date? The signal strength would be too weak to make a
24 call but it would not necessarily for it to be too weak to show
25 up as a data hit?

1 WITNESS D'ERRICO: As a Wi-Fi, correct, yes.

2 THE COURT: Okay.

3 WITNESS D'ERRICO: Yes, your Honor.

4

5 BY MR. MIKULA:

6 Q Looking at pages fifty and 58 if you could for a
7 moment, let me know when you're at page fifty.

8 A I have page fifty.

9 Q Okay. And on rows 2202 and 2203, do you see the
10 display radius that's identified?

11 A 2202 and 2203, correct?

12 Q Yes, sir.

13 A Yes, a display radius of four meters.

14 Q Okay and with regard to the source, do you see what
15 it identifies?

16 A I believe it says unknown, the correct, the full value
17 is unknown as a source.

18 Q Okay and what does that mean?

19 A That Google, when Google provided the records, they
20 had an unknown source.

21 Q And look at page 58 and you see two unknowns
22 there as well?

23 A Yes, I do.

24 Q Tell me, what rows are those on?

25 A 2259 and, I'm sorry, 2559 and 2560.

1 Q Okay and like you said you don't know how, why
2 Google produced that information?

3 A No, I don't. It was obviously in their system, which
4 is why they produced it and they marked it as unknown
5 source.

6 Q Okay, if we could turn back to your presentation
7 that you created for the day if you could. And if you could turn
8 to page eighteen and let me know when you are there.

9 A I have page eighteen.

10 Q Okay, on this page you identified it as an
11 observation conducted here at the Henrico County
12 Administration Building, is that correct?

13 A Yes, that's correct.

14 Q And you show the location of the Google location
15 services point in green, is that correct?

16 A That's correct.

17 Q All right and you show your observed location in red,
18 is that what you're saying?

19 A Yes, it is.

20 Q Okay, did you go into the administration building
21 and locate the Wi-Fi access point?

22 A No, I did not.

23 Q Okay. Wouldn't the location of the Wi-Fi access
24 point give you a better observed location to compare to Google
25 location services?

1 A No, it would not.

2 Q Why not?

3 A Because that is the point where I was taking my
4 measurements from; that observed location. So what I am
5 trying to test is what information is Google going to provide
6 back to me when I provide it observations from that point. So
7 regardless of where that Wi-Fi access point is, I don't need to
8 know that. Google is making that determination when it
9 calculates its Google estimated location.

10 Q But you don't know how Google identifies the access
11 point, correct?

12 A I know Google's collection practice because we
13 talked about that earlier that it crowdsources this information
14 from billions of phones. And that was documented on its
15 leaflet and that it was documented to the FCC in fact that
16 Google collects Wi-Fi or collects this data using their street
17 cars.

18 Q But today you can't say where the access point is in
19 this observation, number one?

20 A That's correct. I don't know where the access points
21 are.

22 Q Okay.

23 A And it was multiple access points observed if you
24 look at the chart in the rear, page 31. You can see there is a
25 total number of BSSIDs was 35 for that location.

1 Q Say that one more time?

2 A So the number of access points that I observed from
3 that red point on slide eighteen.

4 Q Right.

5 A Course is documented on page 31, line one, under
6 the column number of BSSIDs.

7 Q So are you saying that's the number of Wi-Fi access
8 points where you were standing were 35?

9 A Where I was standing, my phone or my computer
10 observed signals from 35 different BSSIDs or access points.

11 Q Okay, access points, thank you.

12 A And let me clarify, too, there could be multiple
13 BSSIDs on a single access point.

14 Q So if you can't determine the Wi-Fi access point and
15 you're saying Google knows that but you don't, how exactly did
16 you decide where to place your observation point?

17 A I collected that observation point off my phone. I
18 turned on my phone. I asked it for the GPS coordinates of
19 where I was located and I plotted that on the map because
20 that's where my computer was stationed while collecting the
21 Wi-Fi data. So essentially that's the equivalent of me standing
22 outside with my phone looking at my phone and Google
23 drawing the blue dot on the map of where I was.

24 Q Okay, is it true that you could still get a Wi-Fi signal
25 at other locations in the parking lot?

1 A I don't know, I didn't test it.

2 Q Okay, if you didn't locate the access point that you
3 believe was being used by Google, how can you determine the
4 accuracy of Google location services?

5 A I can determine the accuracy because I know where
6 I was and I measure where I was from where Google estimated
7 me to be and I can measure that distance and tell you that I
8 was standing here at this point, the red dot on the map. And
9 that Google was telling me that it thinks I am standing at that
10 green point on the dot and I can measure that distance and
11 determine the difference.

12 Q Okay. But isn't it true that four of the thirteen
13 observations that you did, your observation location was
14 outside of Google's range?

15 A That's correct, yes.

16 Q Okay and do you know why that's the case?

17 A I don't know why. All I know is that I sent data up
18 to Google that was collected at those locations. Google
19 processed it in its algorithm and did whatever it does and it
20 sends back to me the location information of where it believes
21 that it is.

22 Q Okay. Is there any reason why you chose just
23 thirteen tests to run, or thirteen different observations let's
24 say?

25 A I know it was not a, just drove around to locations

1 that I thought would be interesting in order to collect
2 observations. And I tried to mix it with public buildings, you
3 know, shopping centers, apartment complexes, townhouses, to
4 get just a general lay in this area what this information would
5 look like.

6 Q Would you agree that running more tests would give
7 you a better point of accuracy if you did more tests than just
8 thirteen?

9 A Most likely. This is a very small sample size.

10 Q Okay, what is the standard sample size to use in
11 this scenario?

12 A Well, this was just observations. I'm not writing a
13 scientific test or anything. This is just a sample observation of
14 what I'm looking at. I'm not a research scientist in that area so
15 I don't know what a standard sample set would be.

16 Q Okay.

17

18 MR. MIKULA: If I could have a minute, Judge.

19 THE COURT: Sure.

20

21 BY MR. MIKULA:

22 Q Can you turn to page 31 of this presentation? Are
23 you there?

24 A I am, yes.

25 Q Okay. You were testifying previously about the, I

1 believe it was the RSSI maximum and minimum and the closer
2 to zero is the more accurate it is?

3 A It's a stronger signal strength.

4 Q Okay, so how weak of a signal strength is it, what's
5 the scale of strength for an RSSI?

6 A A strong RSSI would be in the negative thirty range.
7 That's fairly strong coming off of a Wi-Fi router. And a usable
8 signal, you know, it depends on many factors but, you know,
9 basically once you get into negative one hundred it's unusable.

10 Q Okay and it's fair to say that you have ten that's
11 listed under thirteen that is ninety or above, is that fair to say?

12 A For which column, the minimum, maximum or
13 average?

14 Q The minimum.

15 A The minimum, ten, I have eleven but.

16 Q So eleven of the thirteen are in the ninety range, is
17 that your testimony?

18 A Yes.

19 Q Okay and you said over a hundred is unusable?

20 A Pretty much, yes.

21 Q What are the experts in your field say about a range
22 that's ninety to a hundred?

23 A It's a weak signal.

24 Q Okay. With regard to the Gay case that you testified
25 to previously, did the attorneys in that case challenge the

1 admissibility of the Google evidence?

2 A No, they did not.

3

4 MR. MIKULA: I have nothing further.

5 THE COURT: Any redirect?

6 MS. ULMER: Briefly, yes, sir.

7

8

9

10 REDIRECT EXAMINATION

11 BY MS. ULMER:

12 Q In regards to the Google data, the large excel sheet
13 in front of you, for the device tag, have you seen that exact
14 duplicate number in any other Google location data sat that
15 you've ever –

16

17 MR. MIKULA: Objection, asked and answered.

18 MS. ULMER: Actually, he was not allowed to answer
19 that question.

20 MR. ACKLEY: It was stricken.

21 MS. ULMER: It was stricken from the record.

22 MR. MIKULA: I don't know if I did that but I'll
23 stipulate to that.

24 THE COURT: Stipulate to what?

25 MR. MIKULA: I'll stipulate that that number is, I'll

1 stipulate that that number has not been used and has not
2 been seen in any other, I guess, case if that was the question.

3 THE COURT: Well, I'd like for the witness to testify
4 so this Court would be clear as to what the answer would be.
5 So, did you understand the question?

6 WITNESS D'ERRICO: I did, your Honor.

7 THE COURT: And what's your answer?

8 WITNESS D'ERRICO: I've never seen this sequence
9 of digits in any other Google location history data that I've
10 reviewed.

11

12 BY MS. ULMER:

13 Q And then when talking about your own
14 observations, Mr. Mikula and you were discussing that the
15 double the accuracy radius, the Google had you within a
16 double accuracy radius ninety percent of the time, right?

17 A That's correct. And the point I was trying to make is
18 it's still in the ballpark. We're not talking about that it's at
19 another location; that it's in Chesterfield County, that it's in
20 Richmond City. All of these measurements were within double
21 digit meters off and except for the last one, which was two
22 hundred meters, I believe. It's still a relatively small number
23 compared to, you know, the size of the universe.

24 Q So we're talking about miles off?

25 A No, we're not even miles.

1

2 MS. ULMER: Those are all the questions I have.

3 THE COURT: As to the points that you put into the
4 different bubbles for lack of a better word, you took those from
5 the entry on the assembled 59 pages, is that correct?

6 WITNESS D'ERRICO: That's correct. So every dot
7 or every marking up there is, corresponds to a line in this
8 report.

9 THE COURT: So it's not, there is not any, there is
10 not a bubble for every entry?

11 WITNESS D'ERRICO: There is not.

12 THE COURT: Okay.

13 WITNESS D'ERRICO: I looked at certain relevant
14 times to the investigation and plotted those out.

15 THE COURT: And do you know what entry numbers
16 you have plotted on the presentation?

17 WITNESS D'ERRICO: I would have to go back and
18 compare it to the time on the record to the times on the slides
19 but there is, they do correspond.

20 THE COURT: My question to you is, do you know
21 whether any of the bubbles that you used had the unknown
22 source?

23 WITNESS D'ERRICO: I do know the answer and
24 well, if I could review the slides real quick I can tell you that
25 answer.

1 THE COURT: Okay.

2 WITNESS D'ERRICO: If I did use an unknown, it
3 would appear in that box in the top left and that's where I
4 detail out the number of points and what type are on that
5 chart and the timeframes. I did not use any unknowns on
6 these charts, your Honor.

7 THE COURT: Does that prompt any questions for
8 anyone?

9 MS. ULMER: No, sir.

10 MR. MIKULA: I'd like to ask one.

11 THE COURT: Okay.

12 MR. MIKULA: Well, one quick question, Judge, if I
13 could.

14 THE COURT: Okay.

15

16 RE-CROSS EXAMINATION

17 BY MR. MIKULA:

18 Q With regard to the observations you did, you used
19 obviously your observation point as well as the range of
20 accuracy, correct?

21 A That's correct.

22 Q Would it be fair to say that for let's say, what is the
23 date range, for pages 39 through 45 would it be fair to say that
24 a Google accuracy range should be used in those as well as
25 opposed to a pinpoint drop?

1 A Yeah and that's a great point. By the markers on
2 here I'm not trying to indicate that there is a pinpoint of where
3 it is and that's why I include on the top left that block of the
4 estimated –

5

6 THE COURT: As a range?

7 WITNESS D'ERRICO: As a range, right. So each
8 point in this slide, so if I could take slide 39 as an example.
9 On slide 39, I plotted two GPS points and 57 Wi-Fi points.
10 Now, those two GPS points because there is only two, one of
11 them is 13 meters and the other one is thirty meters. For the
12 Wi-Fi points, every point in there is either somewhere between
13 20 and 29 meters. I could plot those on the map. It gets very
14 sloppy and very hard to understand very quickly. So I chose to
15 create a box instead to capture that information. And there is
16 a scale down in the bottom right hand corner to help you
17 determine what that range is.

18

19 THE COURT: Any additional questions?

20 MR. MIKULA: No, sir.

21 THE COURT: May the Special Agent be excused?

22 MS. ULMER: I'd ask him to remain for a while.

23 THE COURT: All right, you may step down.

24 WITNESS D'ERRICO: Thank you.

25 WITNESS STOOD ASIDE;

1

2 THE COURT: Any additional evidence for the
3 Commonwealth?

4 MS. ULMER: Your Honor, the Commonwealth
5 would like to move into evidence the presentation and for the
6 record and to make sure we're on the same page at this time,
7 the Commonwealth will take out slides 33 through 37 so
8 restarting with slide 38.

9 THE COURT: Any objection, Mr. Mikula?

10 MR. MIKULA: 33 through 37, correct?

11 MS. ULMER: Including into that 37.

12 MR. MIKULA: Yes.

13 THE COURT: Pages 33 through 37 inclusive?

14 MR. MIKULA: Yes.

15 THE COURT: Would be taken out, any objection?

16 MR. MIKULA: No, sir.

17 THE COURT: All right, the Court will use its copy
18 and will tear out pages 33 –

19 MS. ULMER: I have a copy.

20 THE COURT: Fair enough, all right, okay. I'm still
21 going to do it for my copy to make sure that I don't have it.

22 MS. ULMER: And the Commonwealth would like to
23 move the presentation as the Commonwealth's Exhibit number
24 four, I believe.

25 MR. MIKULA: The observation presentation?

1 THE COURT: Yes.

2 MR. MIKULA: I thought that was two, so number
3 four?

4 MR. ACKLEY: What was two?

5 THE COURT: Two would be the photographs.

6 MS. ULMER: The photographs, number three was
7 the –

8 MR. MIKULA: The photos in Kroger.

9 MS. ULMER: And the jail call should be four, so this
10 should be five. This should be five.

11 THE COURT: I have the number one is the first
12 disk.

13 MR. MIKULA: Correct.

14 MS. ULMER: Yes.

15 THE COURT: Number two are the three pictures at
16 Kroger.

17 MR. MIKULA: Correct.

18 MS. ULMER: Yes.

19 THE COURT: Number three with the Kroger ATM
20 pictures?

21 MS. ULMER: Yes.

22 THE COURT: Number four were the jail calls and
23 this would be Commonwealth's number five?

24 MR. MIKULA: Yes, sir.

25 MS. ULMER: Yes, Judge.

1 THE COURT: Number five.

2

3 NOTE: Commonwealth's Exhibit 5.

4

5 THE COURT: Anything further?

6 MS. ULMER: Not from the Commonwealth.

7 THE COURT: Any evidence for the Defendant?

8 MR. MIKULA: Yes, sir, Judge. Judge, I'd like to call
9 Jake Green to the stand, please.

10 THE COURT: Why don't we do this? It's 12:58,
11 we've been doing this for a little bit more than an hour. Let's
12 take about a five minute break and everybody stretch his or
13 her legs.

14

15 NOTE: A RECESS IS HAD; WHEREUPON THE PROCEEDINGS
16 CONTINUE, VIS:

17

18 THE COURT: We're back on the record at 1:07 p.m.
19 You may have a seat, sir. The Defendant is present. Mr.
20 Mikula continues on behalf of the Defendant. Both Mr. Ackley
21 and Ms. Ulmer are present on behalf of the Commonwealth.
22 First witness on behalf of the Defendant?

23 MR. MIKULA: Mr. Jacob Green, sir.

24 THE COURT: Mr. Green, please.

25 THE DEPUTY: Would you stand for me, please?

1 THE COURT: Please watch your step as you step
2 through the opening. Would you raise your right hand? Do
3 you swear or affirm the testimony you're about to give is the
4 truth, the whole truth and nothing but the truth?

5 WITNESS GREEN: Yes, sir, your Honor.

6 THE COURT: You may have a seat.

7 WITNESS GREEN: Thank you.

8 THE COURT: Mr. Mikula?

9 MR. MIKULA: Yes, sir.

10

11 **WILLIAM JACOB GREEN**, the witness, having
12 previously been duly sworn, testified as follows:

13

14 DIRECT EXAMINATION

15 BY MR. MIKULA:

16 Q Could you please state your name for the record?

17 A Yes, sir. My name is William Jacob Green, last
18 name is G-R-E-E-N.

19 Q And Mr. Green, how are you employed?

20 A I work with Envista Forensics in Morrisville, North
21 Carolina.

22 Q What is Envista?

23 A Envista is a digital forensics company as well as an
24 engineering company that assists clients across the globe. The
25 Morrisville office is specifically a digital forensics branch of

1 Envista. We work with attorneys, businesses, insurance
2 companies to interpret digital evidence and occasionally
3 provide opinions within criminal and civil courts.

4 Q Okay and how long has Envista been in existence?

5 A Envista was previously a company called PT&C
6 LWG. That company has been around since the nineties.

7 Q Okay and what are your duties there?

8 A I work with criminal defense attorneys as well as
9 sometimes prosecutors in the interpretation of records, the
10 analysis of cell phone and computer evidence, GPS evidence
11 and then the presentation of those devices and evidence in
12 Court.

13 Q Okay and how long have you been with Envista?

14 A A little over two and a half years.

15 Q Okay, going back, where did you receive your
16 undergraduate education?

17 A Received a Bachelor's of Science in criminal justice
18 from Appalachian State University in Boone, North Carolina.

19 Q Okay and what was that degree in?

20 A Criminal justice.

21 Q Okay and did you receive any sort of forensic
22 experience after your undergraduate degree?

23 A Yes, sir. In 2006, I was hired to be a police officer
24 with the city of Rock Hill, South Carolina, just south of
25 Charlotte, North Carolina. I was on patrol for five years and

1 then moved into the criminal investigations division as a
2 forensic investigator and assigned to our county task force to
3 investigate crime scenes and digital evidence. In 2014, I was
4 selected to become a part of the United States Secret Service
5 electronic crimes task force based out of Columbia, South
6 Carolina. The bulk of my training and experience came from
7 2014 on.

8 Q Okay and what type of crimes do you have
9 experience with when you were with the Rock Hill Police
10 Department?

11 A Everything ranging from car break-ins in the middle
12 of the night to burglaries to, all the way up to murders.

13 Q Okay and you said that you were with the York
14 County multijurisdictional forensic service unit?

15 A That is correct. That is the forensic task force that
16 was assigned to our county.

17 Q Okay and if you could explain to the Court a little bit
18 about your experience with electronic devices while you were
19 with the YCMFSU?

20 A Yes, sir. So within our county task force, specifically
21 and kind of happenstance, we were right next to our drug
22 enforcement unit. They would bring in cell phones, we would
23 utilize the police technology that was brought up by the Special
24 Agent, Cellbrite to do the analysis of those cell phones and
25 provide that data back to the narcotics officers. We would also

1 sometimes get computers and then assist with search warrants
2 to companies like Google, Facebook, Snapchat, Twitter, to
3 recover data that was not stored specifically on the device but
4 stored on those servers owned by those companies.

5 Q Okay and in May of 2014, you left that I guess
6 employment and went somewhere else?

7 A No, it was within 2014, the entire time while I was
8 assigned to the forensics task force, my paycheck still came
9 from the city of Rock Hill.

10 Q Okay.

11 A So I was still a police officer with Rock Hill on
12 assignment to these locations. So I became a task force
13 member of secret services as a special deputy U.S. Marshal
14 and assigned to secret service for the tasks of assisting in the
15 analysis investigation of electronic crimes.

16

17 THE COURT: You were still with the police
18 department but you were assigned as a special secret service
19 agent much like a special U.S. attorney would be from a state
20 prosecutor's office?

21 WITNESS GREEN: Similar.

22 THE COURT: A designation?

23 WITNESS GREEN: Yes, sir.

24 THE COURT: Got it.

25

1 BY MR. MIKULA:

2 Q How many hours of experience do you have with
3 digital forensics?

4 A Over six hundred hours at this point. Over 1200
5 hours in forensic and investigations.

6 Q Okay and do you have any specialized training or
7 any specialized degrees with regard to forensic science?

8 A I have three certifications currently. They are in cell
9 phone forensics through Cellbrite as a certified
10 operator/analyst and then a computer forensics certification
11 through a company called Black Bag Technologies.

12 Q Okay. And through your training and experience,
13 have you ever investigated or been educated on Google?

14 A I have as a law enforcement officer and as a
15 reviewer, typically on the Defense side, I have personally
16 reviewed Google location services both while requesting that
17 with a search warrant to Google and receiving a response from
18 Google and then also through discovery practices within
19 courts.

20 Q So you've dealt with Google location services in
21 courts before?

22 A Yes, sir.

23 Q Which jurisdictions?

24 A Specifically, the United States Federal Court,
25 Northern District of Ohio in Cleveland, Ohio.

1 Q Any other state courts?

2 A No, sir. I've testified as an expert in other state
3 courts but not specifically for location history.

4 Q Okay. Are you affiliated with any professional
5 memberships?

6 A IACIS, the International Association of Computer
7 Investigative Specialists.

8 Q Okay.

9

10 MR. MIKULA: And at this time I'd ask that he be
11 identified as an expert in digital forensics as well as location
12 services, Judge.

13 MR. ACKLEY: If I could voir dire on that, please,
14 your Honor.

15 THE COURT: Yes.

16

17 VOIR DIRE EXAMINATION

18 BY MR. ACKLEY:

19 Q Sir, with respect to the, you said you dealt with
20 Google location services in a case in the Northern District of
21 Ohio?

22 A Yes, sir. United States versus Sean Smith. We dealt
23 with many location evidence pieces of which the CAST team
24 had provided us responses from Verizon as well as Google.

25 Q So similar to this case?

1 A It was a totality of many pieces of evidence.

2 Q Okay, but you got a report that was similar to what
3 has been provided to Mr. Mikula in this case?

4 A Similarly, yes, sir.

5 Q Okay and when was that case?

6 A That was I believe April of 2018.

7 Q All right and did you testify as an expert with regard
8 to the Google location information?

9 A Cellular analysis with the specific location
10 information.

11 Q Okay, so the cellular analysis meaning the
12 information taken directly off of the phone itself?

13 A Off the phone as well as the records as provided by
14 those companies.

15 Q Okay, and so you did testify as an expert and you
16 were accepted by the court as an expert in that area?

17 A Yes, sir.

18 Q All right and but Cellbrite and Black Bag Technology
19 primarily when you are using those you are looking at call
20 detail records, is that fair?

21 A Can you repeat that?

22 Q When you are using Cellbrite and Black Bag's
23 information, you are typically dealing with call detail records?

24 A No, sir, no. Cellbrite and Black Bag focus on the
25 actual piece of hardware.

1 Q Right.

2 A So the cell phone and computer.

3 Q But I mean when you download the information,
4 what are you reviewing in the, out of that?

5 A The data as it was contained within that cell phone.

6 Q Okay and you said sixteen hours is how much
7 training you've had in this, I think you said –

8 A Over six hundred.

9 Q Six hundred, all right.

10

11 THE COURT: Six hundred in the digital, twelve
12 hundred on the forensic.

13 MR. ACKLEY: Understood, all right. Thank you. No
14 other questions.

15 THE COURT: Any objection to the designation as an
16 expert in digital forensics and location forensics?

17 MR. ACKLEY: No, sir.

18 THE COURT: The Court will receive Mr. William
19 Jacob Green as an expert in digital forensics and location
20 forensics. Mr. Mikula?

21 MR. MIKULA: Thank you, Judge.

22

23 FURTHER DIRECT EXAMINATION

24 BY MR. MIKULA:

25 Q Let's talk a little bit about Google. How does Google

1 location services work?

2 A So Google location services is something that runs in
3 the background of our devices. It's constantly tracking where
4 we are going, where we've been and historically recording that
5 within Google's methodology as they've been described through
6 APIs, which is the actual software within our cell phones and
7 then how that location, how that information is then taken up
8 to the cloud and stored on Google's servers.

9 Q Okay, are you familiar with its intended use?

10 A Intended use as a consumer and as an expert is
11 things like mapping your location, things like advertisements.
12 They've been described already to the courts.

13 Q Okay, with regard to it being used as a forensic tool,
14 are you familiar with that?

15 A Yes, sir, as a law enforcement officer and as an
16 expert.

17 Q Okay and how long has that been used historically
18 as a forensic tool?

19 A So Android, the actual operating system that is kept
20 up with by Google has been around since about 2008. Early
21 stages were built on a Linux platform. So Linux is an open
22 source tool for operating systems. It's comparable to Windows
23 or Mac. Linux is again an open source tool so the reason we
24 have so many different variations of Android is because they
25 are all built on that same piece of technology.

1 Q Okay are you familiar with the process by which
2 Google says they collect Wi-Fi, GPS and cell data?

3 A To a point, yes, sir. Google has been, it's very, it's
4 confidential and a trade secret on how and why. The vast
5 majority of things that we do know is due to reverse
6 engineering by people that work with the government as well
7 as entities outside of the government.

8 Q Okay and has in your experience, has Google ever
9 acknowledged ways in which to improve accuracy of their
10 information?

11 A So some of the most specific ways, again going back
12 to what's been testified, the location information is gathered
13 and the user actually has to submit an actual affirmative
14 response to Google during installation on the device like a cell
15 phone. When that device, as soon as that location is approved,
16 the cell phone will begin that transmission of data back to
17 Google. So it's typically done that way though it can be
18 disabled.

19 Q Okay and how do they speak about improving
20 accuracy through their website and their different advertising
21 materials that you've seen?

22 A So one of the most frequent ways that we see is that
23 Google requests through the Android operating system for the
24 user to turn on Wi-Fi to improve accuracy. If the Wi-Fi is off,
25 the accuracy could diminish.

1 Q And why is that?

2 A Some of our most forensically valid, forensically
3 specific locations come from things like Bluetooth connections,
4 which are very limited in their distance and they can travel as
5 well as Wi-Fi. GPS is very specific in the realm of location
6 evidence and then the most, broadest would be our cellular
7 tower services through companies like AT&T and Verizon.

8 Q Okay, with regard to any entities speaking on
9 reliability, are you familiar with any studies regarding that
10 have put forth reports on the reliability of Google's location
11 services?

12 A Not necessarily the reliability of Google services. I've
13 read scientific research papers regarding the application of
14 Google's location services through the Google location history
15 services but nothing specifically within the scientific
16 methodologies for that.

17 Q What does Google say regarding the location services
18 that they provide?

19 A Very limited. They indicate that this is a proprietary
20 piece of technology. They do not release how and what they
21 actually use these pieces of information for.

22 Q Do you know anybody outside of Google that is
23 familiar with Google's algorithms?

24 A No.

25 Q Or the margin of error of their data?

1 A No.

2 Q Okay.

3

4 MR. MIKULA: Regarding if we could, do you mind
5 sir placing the cellular data, or excuse me, cellular analysis
6 survey team's presentation observation, Exhibit number five
7 up? Thank you.

8 THE COURT: Would it be helpful for the witness to
9 have what's been previous marked as Commonwealth's
10 number five?

11 MR. MIKULA: I think that's a better approach,
12 thank you, Judge.

13 THE COURT: All right, you're welcome.

14 WITNESS GREEN: Page five?

15

16 BY MR. MIKULA:

17 Q Yes, sir.

18 A Yes, sir.

19 Q So, I'm sorry, pages two through nine if you could
20 look at those pages. Do you see that range of pages?

21 A Yes, sir, I do.

22 Q Okay. And you were in the courtroom previously
23 when Mr. D'Errico testified regarding those pages?

24 A Yes, sir.

25 Q Have you seen that information before today?

1 A Yes, sir, I have.

2 Q And to your knowledge, where does that information
3 come from?

4 A So the vast majority of this comes from either the
5 privacy policies by Google as well as the terms and services of
6 use of the Android products that they maintain.

7 Q Okay and is this advertising material to your
8 knowledge?

9 A To my knowledge, this is the again going to back to
10 the policies and the how and why Google or I guess more the
11 how and, how Google is going to take this information. Not
12 necessarily why they are taking it or what they are taking it for,
13 so to me this isn't advertisement, this is something a business
14 practice, not necessarily scientific research.

15 Q Are you familiar with any scientific research of
16 Google's location services?

17

18 MR. ACKLEY: Objection, asked and answered.

19 THE COURT: I'll allow it.

20 WITNESS GREEN: No, sir. None that were
21 produced by Google.

22

23 BY MR. MIKULA:

24 Q And if I could direct you to –

25

1 MR. MIKULA: I'm sorry, Judge, I just need to look
2 at this a little closer. I got it today.

3

4 BY MR. MIKULA:

5 Q Let me go in a different direction briefly. You heard
6 previous testimony regarding Mr. D'Errico talking about the
7 information received by Google, did you not?

8 A Yes, sir.

9 Q Okay and that information and his qualifications he
10 testified to having previous experience, you heard that?

11 A Yes, sir.

12 Q Within the Google location services application?

13 A Yes, sir.

14 Q Are you familiar with how CAST members are
15 educated on this information?

16 A Through their testimony in courts, yes, sir.

17 Q Okay and where does that information come from,
18 who educates CAST members on Google location services as
19 well as cell phone, Wi-Fi and GPS sources?

20 A So much of CAST's training and experience comes
21 from cell phone providers like Verizon, AT&T, the major
22 carriers and that's done on an annual basis to keep those
23 members up to speed on changes to the networks and how to
24 interpret those reports. To our knowledge, Google has never
25 provided training or any validation to their Google location

1 services reports.

2 Q With regard to page sixteen of that presentation,
3 could you go to that page, please?

4 A Yes, sir.

5 Q Okay, do you have any concerns with regard to what
6 you observed with the methodology and observation location
7 that's identified as .2 and .2.1?

8 A So the biggest issues that we see here are the
9 sample size that's used here. Thirteen, especially when we're
10 looking at a set of data that spans over 2600 pieces of evidence
11 that were provided by Google, thirteen is an extremely low
12 number.

13 Q Okay. And if you could turn to page eighteen as
14 well.

15 A Yes, sir.

16 Q Page eighteen, what do you see?

17 A So eighteen as it's been marked with the observed
18 location, the Google location and the Google accuracy range,
19 the Google location is a value that is assigned via a latitude
20 and longitudinal point by Google and is actually not a fixed
21 location. The accuracy range would indicate that the point
22 that Google is trying to pinpoint in this area is within that
23 accuracy range, not that specific point.

24 Q Okay.

25 A So a specific point on a map can be very misleading.

1 Q Okay, so with regard to the Wi-Fi access point and
2 this kind of goes back to the previous page, page seventeen, do
3 you, is there any sort of disclosure about the distance of the
4 access point from the observation point that you see?

5 A So it's important to know, I think in the chart
6 towards the back of the state's exhibit, the number of locations
7 that are actually broadcasting these signals, it's important to
8 know where that is actually coming from. You can be
9 extremely, much more confident if you know where that is
10 broadcasting from. And if you have a lot of network traffic
11 being broadcast over 33 bandwidths, we need to know exactly
12 where it's coming from in order to pinpoint that actual
13 broadcasting antenna.

14 Q Okay and in terms of the and I guess is that a factor
15 that might affect the range of the Wi-Fi router or the access
16 point?

17 A Absolutely. Going back to an indoor and outdoor
18 scenario. In my experience and my training and the research
19 that I've seen, the theoretical distances, the numbers that were
20 provided to the Court earlier and much safer numbers for an
21 exterior mounted consumer antenna as we've seen in the data
22 is more likely to be less than those described to the Court.

23 Q And what would you say is a more reliable figure or
24 figures?

25 A So with a clear line of sight to the antenna, we can

1 be plus or minus fifty meters or about a hundred feet, or I
2 apologize, that would be 150 feet.

3 Q And is that inside or outside?

4 A That would be an exterior mounted Wi-Fi antenna.

5 Q What about inside?

6 A Interior depending on the way the structure is built,
7 concrete versus wood, glass structures more than likely less
8 than thirty meters.

9 Q Okay and is that dependent upon other things as
10 well, not just being indoors or outdoors?

11 A Yes, I mean there is many environmental factors,
12 humidity, temperature, all of these things can affect
13 wavelength and how data is transmitted over the air.

14 Q Okay.

15

16 THE COURT: Are you saying that you're disputing
17 the Google accuracy radius?

18 WITNESS GREEN: Well, it's not necessarily the
19 Google accuracy radius because we don't know how Google
20 calculates that. It's the overall broadcast distance of a
21 consumer level Wi-Fi point.

22

23 BY MR. MIKULA:

24 Q So with regard to, you said 150 feet or fifty meters is
25 the most reliable or I'm sorry, can you repeat what you said

1 regarding what you see with regard to fifty meters and how
2 that figure could go down or up?

3 A Yeah, so the numbers that were provided to the
4 Court of over 200 meters is a very specific alteration to a Wi-Fi
5 antenna that focuses that antenna. You don't see this in the
6 wild. I've never experienced it in law enforcement
7 investigations or as a defense investigator. We don't see those
8 types of numbers in the real world. It can be done in a
9 scientific lab for sure as it has been documented. But we don't
10 see typical exterior mounted Wi-Fi antennas going beyond fifty
11 meters.

12 Q What would you classify anything over fifty meters to
13 be? So is it invalid or anything that you view like for instance,
14 if I could direct your attention to Exhibit number one and I can
15 pass this up.

16 A Thank you.

17 Q If you could go to line 167.

18 A Yes, sir. I'm there.

19 Q What is that max radius, max display radius figure?

20 A So Google is providing a radius of 245 meters.

21 Q Okay and so have you ever seen that as you
22 classified in the wild before?

23 A No, sir.

24 Q Okay, have you ever seen a figure in the wild over
25 fifty meters?

1 A It's possible. Again, depending on the type of router
2 but fifty is really pushing what a consumer level in a
3 residential area router would push.

4 Q What is a, let's say it's a consumer grade router,
5 what do you generally, what is the figure that is reliable in your
6 expertise?

7 A I think under, for an exterior mounted, about fifty
8 meters. Interior mounted, depending on construction, thirty
9 meters.

10 Q Okay, so what does that figure tell you that you see
11 on line 167?

12 A This is either an anomaly or inconsistent data. It's
13 not physically possible for two thousand meters to use Wi-Fi
14 signal.

15 Q Okay, so are you saying that based on your area of
16 expertise and your training and experience, anything over fifty
17 meters should be considered not reliable?

18 A I think scientifically improbable.

19 Q Anything over fifty meters?

20 A Yes, sir.

21 Q What about let's say thirty to fifty meters?

22 A It's possible, but again it really comes down to the
23 type of antenna pushing that signal. If it's in a residential
24 location versus a business. Things like gas stations with
25 exterior mounted antennas can go as far as fifty meters if not

1 beyond.

2 Q For each of these data points that you have seen in
3 this presentation, during the life of this case, have you ever
4 been given what the actual router style is for each of these data
5 points?

6 A No, sir.

7 Q Okay and let's assume, well there are data points
8 that you see in that presentation that are under thirty meters,
9 too?

10 A Yes, sir.

11 Q Okay. Should we just accept those as being the
12 truth?

13 A I think given the total nature of the data and that we
14 don't know how and why and what Google does with this, the
15 scientific possibilities, especially when we see huge issues of a
16 two thousand plus meter radius, there has to be more
17 information provided in order to be called scientifically certain.

18 Q Okay, did you make any calculations with how many
19 data points are in that presentation that are over fifty meters?

20 A Yes, sir.

21 Q Okay, how many did you find?

22 A A little more than ten percent of the total. So if we're
23 looking at a total of about 2600, over 260 of those are over fifty
24 meters.

25 Q Okay, of the Wi-Fi data points that you observed in

1 that presentation, how many did you find that were over thirty
2 meters?

3 A 35%, so a little more than seven hundred.

4 Q So approximately 35% of the data points were over
5 thirty meters?

6 A Yes.

7 Q Okay, all right. And what concerns do you have
8 regarding how that affects the data pool generally?

9 A It's we don't know. Google has provided us no
10 documentation on how to interpret their data. We're relying on
11 this solely based on two figures of a latitude and longitude as
12 well as an unknown radius that we have no idea where this
13 point lies within that radius or if it lies outside of the radius.

14 Q If you could, turn to page thirty of the, I'm going
15 back to the Exhibit number five, if you could turn to page
16 thirty of that?

17 A Yes, sir.

18 Q Tell me when you are there.

19 A Yes.

20 Q Okay. Looking at that data point and the Google,
21 excuse me, Google location figure as well as the Google
22 accuracy range, do you see those?

23 A Yes, sir, I do.

24 Q Can you observe where that Wi-Fi access point is
25 coming from?

1 A No, sir.

2 Q And on observation number two, which is page
3 nineteen, or any of these observations, have you been given
4 what the access point is?

5 A No, sir, we have not.

6 Q How many total data points do you have in this
7 presentation?

8 A I'm not sure. I believe it's thirteen, thirteen
9 observations.

10 Q I'm sorry, the total number of data points in the
11 Google data, I'm sorry.

12 A In the raw Google data?

13 Q Yes, sir.

14 A I believe it's 2,611, 2,608.

15 Q Okay. And how many of those are Wi-Fi data
16 points?

17 A I do not remember off the top of my head.

18 Q Okay, is it the majority of those?

19 A Absolutely.

20 Q Okay. And do you have any concern with regard to
21 the Wi-Fi access points as it relates to the cell phone data as
22 well as the GPS data, regarding what you see with the
23 anomalies?

24 A The vast majority of the anomalies do occur within
25 our Wi-Fi ranges. So when we see going well beyond the scope

1 of a consumer or business of a Wi-Fi, they do occur within the
2 Wi-Fi source, not within GPS or cellular towers.

3 Q The number of observation tests done was thirteen,
4 correct?

5 A Yes.

6 Q And is that a fair number in your field to conduct
7 this type of study?

8 A Not necessarily, a scientific study it would not be.

9 Q Okay.

10

11 MR. MIKULA: I have nothing further.

12 THE COURT: Any cross?

13 MR. ACKLEY: Yes, thank you, your Honor.

14

15 CROSS EXAMINATION

16 BY MR. ACKLEY:

17 Q A few questions. It seems like kind of your bottom
18 line issue with utilizing Google location services in the way we
19 are attempting to use it here is that Google has not provided
20 the algorithms and the, if you will, exactly how they arrived at
21 the location information that they provided to us, is that fair?

22 A Well, it's not necessarily the algorithms, it's the
23 validity of this information. They provided it as an uncertain
24 value. So we don't know how scientifically valid all of these
25 data points are.

1 Q Right but in order to be able to test that validity, you
2 have to know the algorithms, is that what you're saying?

3 A Yes.

4 Q Yes, so you know, if Google were to provide the
5 algorithms to the scientific community and the rest of us, there
6 would be no issue because we would be able to test it, correct?

7 A Correct.

8 Q Okay, so even though we don't know those
9 algorithms and we don't know exactly how Google arrives at
10 the location services data, we do know generally how it works
11 and I think both you and Special Agent D'Errico have outlined
12 that, right?

13 A Yes, sir.

14 Q And we do know that generally the location
15 information that Google provides us and that it provides all of
16 our phones when we are using our phones is generally
17 accurate, fair?

18 A Yes, sir.

19 Q Okay, so then when I'm driving down a road and it
20 tells me I'm on Staples Mill Road, I'm usually on Staples Mill
21 Road or a street just adjacent to it?

22 A That's correct.

23 Q Okay. You said that the sample size of Special
24 Agent D'Errico's observations was too small. And I think he
25 would probably agree that thirteen is not anything to base an

1 entire study on. However, did you consider that also the
2 corroboration of other data points in the, did you say 2600,
3 how many data points, approximately 2600?

4 A Yes, sir.

5 Q So the corroboration outlined by the agent of many
6 of those 2600 data points with other information like the jail
7 call, like the video surveillance or the photographs that those
8 can be added to the thirteen as part of a larger examination of
9 the data, is that fair?

10 A Yes, sir.

11 Q Now, you said that the, you find that anything over a
12 fifty meter range is at least suspect in your mind for accuracy?

13 A Yes, sir.

14 Q And you said that there are about ten percent were
15 over fifty meters?

16 A Yes, sir.

17 Q Would you agree with me though that the fifty
18 meters that they are talking about when Google provides the
19 display radius does not necessarily mean that the point was
20 fifty meters away from the Wi-Fi source? In other words, if the
21 receiver, the device that we're using to try to locate attaches
22 itself to four or five different Wi-Fi points, Google will take
23 those four or five different and then give an approximate
24 location, right?

25 A We believe it's an approximate location. We don't

1 know.

2 Q But the thing says it's an approximate location,
3 right? It's an estimated uncertainty value regarding the
4 reported coordinate. So that's an estimated uncertainty value,
5 it's not necessarily an exact distance?

6 A It is not an exact distance, no.

7 Q Right, so when we are saying that anything over a
8 fifty meter display radius means that Google is saying that the
9 device was more than fifty meters away from the Wi-Fi point,
10 that's not exactly accurate?

11 A Well, we don't know. We don't know what the
12 display radius actually means. We can only guess.

13 Q So then the issue with the 2000 and I would agree
14 with you that's probably an anomaly but the, in looking at the
15 data, did you see how many were say over a thousand meters,
16 I would agree that those are large distance, estimated
17 uncertainty values, so how many were over a thousand out of
18 the 2600?

19 A A few, I don't remember exactly.

20 Q You would agree with me that it's a very small
21 number?

22 A That's correct.

23 Q And you would also agree with me, I think, based on
24 your numbers that most of the display radius numbers values
25 were less than thirty meters?

1 A That's correct.

2 Q And you are not saying that the Google location
3 services information is inherently unreliable as a whole?

4

5 MR. MIKULA: I'm going to object. I think that's a
6 determination by the fact finder to make.

7 THE COURT: I think the question calls for his
8 opinion, which I've overruled the objection. I think you can
9 ask him his opinion as to the reliability of it.

10

11 BY MR. ACKLEY:

12 Q It's not your opinion that it is generally unreliable, is
13 that right?

14 A We don't know.

15 Q Okay. But you did agree with me that the location
16 services that we see in a general sense is accurate?

17 A It's accurate to the device, we don't know exactly
18 what it means.

19 Q Right. Incidentally, in reviewing your CV, it looked
20 like you had a great deal of background in crash
21 reconstruction as a police officer?

22 A Yes, sir.

23 Q In law enforcement. In your work in that area, did
24 you utilize EDRs, Event Data Recorders, analyzing essentially
25 the black box?

1 A Yes, sir.

2 Q And you're aware that, did you rely on them for
3 information in reconstructing crash data?

4 A Yes, sir.

5 Q You found them to be reliable?

6 A Reliable to a point, depending on the circumstances.

7 Q All right and it's also true that if not all, most EDRs
8 are proprietary and require proprietary information in order to
9 access their content?

10 A Yes, but most of those manufacturers do provide
11 guidance in interpretation of the data.

12 Q All right but they don't share with you the exact
13 algorithms of how they arrived at that data, right?

14 A No.

15

16 THE COURT: I want to make sure the record is
17 clear. You said right and you said no. So is it correct that they
18 did not share?

19 WITNESS GREEN: They –

20 THE COURT: They did share or they did not?

21 WITNESS GREEN: They do share, they provide
22 guidance.

23 THE COURT: The algorithms?

24 WITNESS GREEN: They do not provide the
25 algorithms.

1 THE COURT: The question was, the question was,
2 did the providers provide you with the algorithms, that was
3 your question?

4 MR. ACKLEY: That's my question.

5 WITNESS GREEN: No.

6 MR. ACKLEY: I don't have any other questions,
7 thank you.

8 THE COURT: Any redirect?

9 MR. MIKULA: No, sir.

10 THE COURT: May Mr. Green be excused or may he
11 step down?

12 MR. MIKULA: Step down.

13 WITNESS STOOD ASIDE;
14

15 THE COURT: All right, any additional evidence for
16 the Defendant? Thank you. Any additional evidence for the
17 Defendant?

18 MR. MIKULA: Well, I think we could stipulate to this
19 but I'll certainly ask the Commonwealth. I was going to call
20 one other witness about the approximate distance from the
21 point in which, well, actually I'll call. I was going to call
22 regarding the distance from the apartment to where the
23 location of the car was. Do you want me to call Mariah to say?
24 You can object.

25 MS. ULMER: What exactly are you asking?

1 MR. ACKLEY: We don't understand.

2 MR. MIKULA: Just to testify regarding the distance
3 from where the residence, from where the Defendant was living
4 at the time to the point which where the vehicle was found.

5 MR. ACKLEY: I mean I can –

6 MR. MIKULA: I can call her and you can object.

7 MR. ACKLEY: Well, I mean I don't think she's going
8 to lie. I think the issue is Mr. Mikula wants to introduce
9 evidence that in our view is trial evidence and not germane to
10 the motion I guess is the best way to put it.

11 THE COURT: I think I might need a little bit more
12 clarification then where we are. We have the motion in limine,
13 which moves the Court to bar the Commonwealth from
14 presenting Google location services data. The Court has heard
15 from the Special Agent and from Mr. Green. Any additional
16 evidence for the Defendant?

17 MR. MIKULA: No, sir.

18 THE COURT: Any rebuttal evidence for the
19 Commonwealth?

20 MS. ULMER: No, your Honor.

21 THE COURT: Anyone care to argue?

22 MS. ULMER: The Commonwealth will waive and
23 respond.

24 THE COURT: Mr. Mikula?

25 MR. MIKULA: Thank you, Judge. Judge, what this

1 come down to is that the Commonwealth wants us to look at
2 some of the data points that they can, they're saying that they
3 can corroborate with other evidence and we should accept all
4 the data points as a whole as being reliable. And I –

5 THE COURT: Let me ask you this. Would everyone
6 agree that this concept is above the lay juror's head?

7 MR. MIKULA: Yes.

8 THE COURT: And that it would need to the extent
9 that it is admissible with expert testimony, to the extent it is
10 admissible would be necessary for its admissibility?

11 MR. ACKLEY: Yes.

12 MS. ULMER: The Commonwealth would agree, yes.

13 THE COURT: Great, okay. Mr. Mikula.

14 MR. MIKULA: Thank you, Judge. What I will tell
15 the Court is, is that we have heard from two expert witnesses,
16 both of them have testified regarding things that are certainly,
17 require specialized knowledge and is certainly above the
18 layperson's head as well as it takes quite a bit of education not
19 just for the Court but also for Defense Counsel and the
20 Commonwealth. The concerns that we have with that is it goes
21 down to what's reliable. And so in this case, Judge, we are
22 guided by the principles set out in Spencer regarding whether
23 or not this information is inherently unreliable and the Court
24 should shield the Jury from it. That's where we are.

25 THE COURT: Let me ask you this. What evidence

1 have I heard that it's inherently unreliable?

2 MR. MIKULA: The evidence you heard that it's
3 inherently unreliable is the Wi-Fi data points based on Mr.
4 Green's testimony, anything over thirty meters, which he said
5 is something that should be taken with serious caution is over
6 35 is 35% of the data points are of question. There are
7 certainly ten percent that is scientifically improbable. The
8 question is because we don't know what Google is saying about
9 this information, all we heard from Mr. D'Errico is what the
10 advertising material is, is that we should accept that this data
11 is accurate. And so that's a problem because certainly while
12 some of it might be considered possible based upon the
13 corroborating evidence that the Commonwealth put on today,
14 how does that affect everything else?

15 THE COURT: But tell me what evidence I've heard
16 that it's inherently unreliable?

17 MR. MIKULA: Row 167 of Exhibit number one.

18 THE COURT: Bad as to one is bad as to all? You
19 can't believe -

20 MR. MIKULA: Well, we don't know. Because no one
21 has been here to testify as to what this is.

22 THE COURT: Tell me how the evidence, what the
23 evidence I've heard that the evidence as a whole is inherently
24 unreliable. Are you telling me that row 167 because everyone
25 believes that that may be an anomaly or an outlier within the

1 spectrum that that in and of itself creates the inherent
2 unreliability of the rest of it?

3 MR. MIKULA: Line 167 does not in and of itself.
4 There's more than just line 167.

5 THE COURT: Okay.

6 MR. MIKULA: There are four unknown data points.
7 There is also up to 35 percent of the Wi-Fi data points that say
8 that it's not, it's, we should approach it with caution and
9 there's ten percent that says it's scientifically improbable. Not
10 only that, Judge, you have –

11 THE COURT: Does it mean that there is ninety
12 percent that makes it scientifically probable if ten percent is
13 scientifically improbable?

14 MR. MIKULA: Judge, inherently, what's inherently
15 unreliable means is in and of itself it should not be relied
16 upon. So I guess it comes down to what the fact finder for
17 today's purpose, which I guess would be the Court, what
18 reliability, what calculation the Court is willing to accept. If
19 the Court wants the ten percent makes something inherently
20 unreliable or does the Court feel like maybe 51%. I think
21 that's a determination or the Court to make.

22 But the concern here, unlike Spencer, which is a
23 case this Court's probably well familiar with but, you know,
24 dealt with the Southside Strangler and you had DNA PCR
25 amplification, which was unique at that time. The

1 Commonwealth in that case called two witnesses, a geneticist
2 and a serologist; both people that were trained and educated in
3 DNA. Those two individuals testified it was something that
4 they were familiar with that had been used in the biological
5 field for over ten years and it was reliable. And so what's
6 unique in this case is, is we don't know what the DNA is.
7 Certainly, we're left to believe Jeremy D'Errico, oh, it's, well we
8 don't know, I've never been told of any problems with it. But
9 we should accept it. And you know, here is some, here is a
10 PowerPoint presentation which shows that it's close to GPS.
11 But all that data comes from Google. We don't know what the
12 foundation is of it. We don't know what the DNA of Google is.

13 THE COURT: So it's your position unless the
14 algorithms are made known to any potential expert witness, no
15 expert can testify on Google location services?

16 MR. MIKULA: I think an expert has to testify that
17 within the field it's understood what this information is and we
18 don't know what Google information is. We don't know, even
19 though it is certainly proprietary so I understand why they're
20 not going to, you know, provide that information and provide
21 that data, that formula if you will. But there is nobody else
22 that knows about it. There is no study that's been done.
23 They've never disclosed the rate of error.

24 And quite frankly, I've not heard any evidence with
25 regard to any of the other forms of Black Box or not Black Box

1 but the accident crash reconstruction, even though it's
2 proprietary, they are familiar with the error rates. They are
3 familiar with that information. But Google, we're not. We're
4 not familiar with any of that. And so we're left to just assume
5 it's good information. It's turned over to the FBI and the FBI
6 goes into Google Earth and they drop it in. And they say well,
7 yeah, here is a range. It's not, you know, it's not this exact
8 location but if you look at and I think raw data is a little
9 misleading because it's raw, it gives the presumption that it's
10 reliable. It's unadulterated.

11 But this is, we don't even know if that's the case.
12 They had figures that bear serious question to whether or not
13 this information should be assumed as a whole as being
14 reliable. And I think the evidence has shown based upon the
15 witnesses that while certainly there is some of this that could
16 be considered based upon a reasonable degree of scientific
17 certainty to be reliable, the question is, is whether the other
18 data points, which are scientifically improbable, how does that
19 affect the whole.

20 And my concern is and my argument certainly here
21 today is that this information, there are serious questions; the
22 data itself, not the presentation regarding the advertising but
23 the 59 or 58 pages that all of this is, which is what we've been
24 looking at, a lot of this information bears serious question to
25 the reliability of this information. And that just goes to one

1 issue.

2 The other issue is, is whether this is something that
3 should be given to a Jury to understand. And I think it should
4 be shielded from the Jury. Why? Because for the one hand,
5 the Jury listens to this as I'm sure most people have been
6 watching this whole proceeding, eyes get glossed over. They're
7 not sure what it is that they are hearing. But even more
8 importantly than that is that we live in a digital age. People
9 here oh, this is coming from Google and is given to the FBI and
10 here are specific data points that are dropped onto a
11 presentation, which even Mr. D'Errico admitted is somewhat
12 misleading, they see that and they just think oh, well, there is
13 no problems with it. Even if they hear from another expert
14 witness that there is some questions as to this.

15 THE COURT: It's a weight issue.

16 MR. MIKULA: Judge, I think Spencer lays out two
17 prongs of the analysis, whether it's unreliable, it's inherently
18 unreliable and if the Court should shield the Jury from seeing
19 this information or hearing this information.

20 THE COURT: Because of the inherentness of the
21 unreliability?

22 MR. MIKULA: I think it's, I still think there are two
23 aspects of it, but yes, certainly the second one is somewhat
24 reliant upon the first.

25 THE COURT: All right, anything further?

1 MR. MIKULA: Judge, I just think that this evidence,
2 the Court has to make a determination as to what inherently
3 unreliable is. And certainly the percentages laid out and
4 testified to by the experts go to the fact that in and of itself, it
5 is not reliable. Thank you.

6 THE COURT: Thank you. Who would like to speak
7 on behalf of the Commonwealth?

8 MS. ULMER: I will, your Honor.

9 THE COURT: Ms. Ulmer?

10 MS. ULMER: Your Honor, Mr. Mikula has laid out
11 exactly what the standard is in Spencer and that is the
12 standard inherently unreliable. This data is not inherently
13 unreliable. Mr. Mikula's own expert Mr. Green says that he
14 knows generally how it works and it's generally accurate when
15 used.

16 In addition to Mr. Mikula's own expert, your Honor,
17 the Commonwealth has given you many instances which show
18 that this evidence is credible and should be given to the Jury
19 for the Jury to determine what it would like out of this
20 evidence.

21 First, Judge, this is not new technology. This is
22 technology that has been around. You've heard from Agent
23 D'Errico that articles were written about Wi-Fi and radio wave
24 data since back in 2006, I believe. One article was written in
25 2008 that was cited by Agent D'Errico. Even Google itself

1 started talking about location data in their privacy policy back
2 in 2009 and updated it in 2012 to include Wi-Fi points and cell
3 towers in addition to the GPS. This is not a new technology.

4 No expert here has come out and said that there is
5 some large study or some big paper saying that Google is a
6 complete farce and that all of this stuff is unreliable and, you
7 know, when you turn on your Google maps you're going to go
8 into a lake.

9 Secondly, your Honor, you can use your own
10 common sense. Google is a multibillion dollar industry. As
11 you saw in Agent D'Errico's presentation, most of the money
12 from Google comes from marketing. And they use Google
13 location service and Google location systems in order to market
14 that to their clients. They would not be in business, they
15 would not be making the money that they make if their
16 product, Google location data, was inherently unreliable.

17 THE COURT: Well, let me ask you this. Mr. Madoff,
18 who is an investor, he had an multibillion dollar business.
19 Was he legitimate?

20 MS. ULMER: He wasn't, Judge, but if the time
21 comes when Google is found to be not legitimate then they
22 fooled us all.

23 THE COURT: So we should, I believe your argument
24 was if you are a multibillion dollar business, then you are
25 legitimate.

1 MS. ULMER: No, sir, Judge. But in this instance,
2 people rely on it. Many people have Samsung phones or
3 Android based phones. People buy that technology. If they
4 didn't, then everyone would own an Apple phone essentially.

5 THE COURT: Perhaps it's not the size of the
6 company, it's the integrity of the company.

7 MS. ULMER: The integrity but I think the integrity
8 is in this instance is outlined with the fact that this company is
9 extremely large and that people buy into it. People choose to
10 buy Samsung phones and not buy iPhones. People choose to
11 use Google Maps and not Apple maps.

12 THE COURT: Are you saying that people are
13 intentionally deciding to buy an Android phone because the
14 Google location services is embedded in the phone versus
15 buying an Apple phone that you have to download an app, is
16 that the Commonwealth's position?

17 MS. ULMER: I think that people do buy Android
18 based phones because they like the system and they like how
19 it works and that's why they choose to do that based
20 sometimes better than an Apple device. If the Android system
21 itself was inherently unreliable, then who would buy the
22 phone? No one would buy the phone.

23 In addition to that, your Honor, you saw in the
24 Commonwealth's evidence the prior testing and the
25 observations done by Agent D'Errico to show that he has

1 himself looked into the accuracy and the reliability of the
2 Google data. He has also spoken to you about the Oracle
3 study and that the data points that they collected using their
4 methodology matched up to the points that were later provided
5 by Google. And in addition to that, it was stipulated by the
6 Defense that in the Gay case that the Google location services
7 was corroborated by other evidence to show that she was at
8 the exact points that the Google said she was at, at the same
9 time that other evidence says that she was there.

10 THE COURT: Was that a stipulation?

11 MS. ULMER: That was stipulation and testimony.

12 MR. MIKULA: I don't think that I stipulated to that.

13

14 THE COURT: I'm not sure there was a stipulation to
15 that. I believe that –

16 MS. ULMER: That was testimony –

17 THE COURT: I believe the Special Agent testified
18 that there was separate corroboration.

19 MS. ULMER: Yes, sir. And so that was before your
20 Honor. And then looking to this particular case, Judge, you
21 can see from the data which we have presented to you that
22 some, a lot of the data is in known locations for the Defendant;
23 his residence, another residence belonging to Roland
24 Anderson, not this Defendant but someone in his family. It
25 has also been corroborated by the victim's RTT data, which has

1 not been said to be unreliable. It was corroborated by his text
2 messages to and from his friend Keion. The Google location
3 services says he was at that Tweeter Court address at
4 approximately the same time where he tells his friend I'm at
5 your crib, which belongs and is registered to a Keion Vaughn.

6 In addition to that, your Honor, you can see from
7 the Kroger video, the GPS or the Google location data points,
8 which are Wi-Fi data points, in addition to the GPS data
9 points, said he was at Kroger at the exact same time that that
10 video has Roland Anderson going into Kroger and getting, and
11 leaving Kroger. Not only do you have the Kroger video, you
12 have the ECO ATM receipt, which is a completely separate
13 company which shows that Roland Anderson was at that ATM,
14 which is ECO ATM, which is inside the Kroger, at 10:39 a.m.
15 which is exactly the same time that the Google location points
16 say that he is at Kroger, Judge.

17 There has been no evidence to say that the Google
18 information is inherently unreliable. To the contrary, there is a
19 lot of evidence showing that it is reliable that this is credible
20 evidence and that should be left up to the fact finder, Judge.
21 This is a question for the Jury. The Jury should be able to
22 hear from Agent D'Errico about this information. And Mr.
23 Mikula is more than welcome obviously to bring Mr. Green
24 back and testify as to why they shouldn't listen to this
25 information.

1 But it is a Jury question. The Jury does not need to
2 be shielded from this, Judge. There has been no evidence to
3 show that it is inherently unreliable. It goes to the weight of
4 the evidence and that is up to the fact finder in this case. And
5 so I'd ask that you allow this information in and to be
6 presented before the Jury.

7 THE COURT: All right, thank you. The Court
8 commends counsel on both sides for a very well presented
9 motion in limine and defense thereof.

10 The Court denies the motion in limine. The Court
11 does not find that the Google location services is inherently
12 unreliable. The Spencer case is the seminal case for the test of
13 admissibility of this type of information. And the Court
14 strongly believes that the issues go to the weight of the
15 evidence, which is a fact issue for the fact finder in this case;
16 that is the Jury. The Court notes the exception to the Court's
17 ruling by Mr. Mikula, counsel for the Defendant.

18 Anything further at this time?

19 MS. ULMER: No, your Honor.

20 MR. ACKLEY: Select a date.

21 MR. MIKULA: Let's choose a trial date.

22 THE COURT: All right and how many days will you
23 need, we're set for three days, is that correct? It can still be
24 tried in three days, Mr. Mikula, as far as you know?

25 MR. MIKULA: Yes, sir.

1 THE COURT: And this is set for a Jury, is that
2 correct?

3 MS. ULMER: Yes, sir.

4 THE COURT: Okay. Mr. Anderson, did you
5 understand the Court's ruling? I trust that you disagree with
6 it but do you understand it, sir?

7 DEFENDANT ANDERSON: Yes, sir.

8 THE COURT: All right. How about a Monday, do
9 you have a Tuesday, Wednesday and then I can add a Monday
10 to it or a Thursday, Friday or excuse me, a Wednesday and
11 we'll add a Friday to it?

12 THE CLERK: We have criminal like Wednesday –

13 THE COURT: Folks what I think we're going to need
14 to do is to have Ms. Sanderford present with the book so that
15 we can attempt to force something. And Ms. Sanderford is not
16 in the courthouse this afternoon. So with everyone's
17 permission we have to reset the setting of the case as soon as
18 practicable. Mr. Anderson is in the custody of the Henrico
19 Sheriff, is that correct?

20 MS. ULMER: Yes, sir.

21 MR. MIKULA: He is.

22 THE COURT: Okay, so his whereabouts will be
23 approximately known or pretty close. So I was thinking
24 perhaps next week at nine o'clock one morning or 8:45 we can
25 have a status and set it.

1 MR. MIKULA: Yes, sir.

2 THE COURT: And then with Special Agent
3 D'Errico's anticipated dates and Mr. Green's anticipated dates,
4 counsel would be able to secure those. All right, what day of
5 the week next week works for everyone?

6 THE CLERK: Wednesday at 8:45.

7 THE COURT: I'm sorry?

8 MS. ULMER: Wednesday the 9th at 8:45.

9 MR. MIKULA: I'm sorry, I can't do that date. I'm
10 here Thursday morning or Tuesday.

11 MS. ULMER: I can't do Tuesdays.

12 THE COURT: How about the 10th, Thursday the 10th
13 at 8:45?

14 MS. ULMER: We can set it for then.

15 THE COURT: 8:30, eight?

16 MR. MIKULA: Whatever time works for the Court.

17 THE COURT: 8:45 on January 10th for status.
18 Anything further?

19 MR. ACKLEY: No, sir.

20 MR. MIKULA: No, sir.

21 THE COURT: Remanded to the custody of the
22 Sheriff. We are off the record at 2:07 p.m. Thank you folks.

23 MR. MIKULA: Thank you.

24 MS. ULMER: Thank you, your Honor.

25

1

PROCEEDINGS CONCLUDED

2

1 STATE OF VIRGINIA,
2 COUNTY OF HENRICO, to-wit:
3

4 I, MEDFORD W. HOWARD, Registered Professional
5 Reporter and Notary Public for the State of Virginia at large, do
6 hereby certify that I was the Court Reporter who transcribed
7 the recorded proceedings of **COMMONWEALTH OF VIRGINIA**
8 **v. ROLAND ELLISWORTH ANDERSON**, heard in the Circuit
9 Court for the County of Henrico. **I have transcribed the**
10 **recording to the best of my ability to understand the**
11 **proceedings herein.**

12 I further certify that the foregoing transcript, pages
13 numbered 1 through 142 is a true and accurate record of the
14 proceedings herein reported, **to the best of my ability to**
15 **understand the audio recording.**

16 Given under my hand this 18th day of February,
17 2019.
18
19
20
21

22 /s/ Medford W. Howard
23 Registered Professional Reporter
24 Notary Public for the State of Virginia at Large
25 Notary Registration Number: 224566